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ABSTRACT

This publication gives, in chart form, insecticides for use on animals, field crops, fruits, flowers, trees and shrubs, household pests, recreation areas, lawn and turf grass, pecans, stored grain, and vegetables. Included in the charts are the insecticides recommended for each insect, formulation to be used, amount, time to apply, and other information. Also included in the booklet is general information about insecticides, calibration of farm sprayers, and poison control. (BE)

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COOPERATIVE EXTENSION SERVICE, UNIVERSITY OF ARKANSAS DIVISION OF AGRICULTURE AND U.S. DEPARTMENT OF AGRICULTURE, COOPERATING

MP 144

INSECTICIDE RECOMMENDATIONS FOR ARKANSAS

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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INTRODUCTION

This insect control guide was prepared by Bill F. Jones and Gordon Barnes, Extension Entomologists, and issued by the Arkansas Cooperative Extension Service.

The use of any chemical suggested in the guide should always be preceded by a careful examination of the container label for directions and precautions. Many insecticides have registrations for uses not listed in this publication. They are not included here because of either a lack of space in the publication, their lack of availability for purchase in the state, their inefficiency for the purpose intended, or their extremely hazardous nature when a less hazardous chemical will do the job just as well.

The chemicals listed in this guide and the rates of application are in conformance with those presented in the E.P.A. Compendium of Registered Pesticides.

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POISON CONTROL CENTERS IN ARKANSAS

The United States Environmental Protection Agency has established a Poison Control System throughout the nation. Participating hospitals function on a voluntary basis to provide special emergency aid in case of chemical intoxication. Each Poison Control Center has the capability to determine the toxic constituent of commercial products, respond to calls from physicians or individuals and provide supportive or antidotal treatment.

Listed below are Poison Control Centers in Arkansas. Inquiries on pesticide or other chemical intoxication should be directed to the nearest Poison Control Center.

Phillip L. Peters, State Coordinator, ... 501-661-2397
State Department of Health
4815 W. Markham Street
Little Rock, Arkansas 72201

Poison Control Center, Warner Brown Hospital, ... 501-863-3161
460 West Oak Street Ext. 221
El Dorado, Arkansas 71730

Poison Control Center, St. Edward's Mercy Hospital, ... 501-782-3071
1411 Rogers Avenue Ext. 210
Fort Smith, Arkansas 72901

Poison Control Center, Sparks Regional Medical Center,. 501-782-2088
1311 S. Eye Street Ext. 381
Fort Smith, Arkansas 72901

Poison Control Center, Boone County Hospital, ... 501-365-6141
620 N. Willow Street Ext. 120
Harrison, Arkansas 72601

Poison Control Center, Helena Hospital, ... 501-338-6411
Hospital Drive Ext. 271
Helena, Arkansas 72342

Poison Control Center, Arkansas Childrens Hospital,. 501-664-5000
804 Wolfe Ext. 415
Little Rock, Arkansas 72201

Poison Control Center, Osceola Memorial Hospital,. 501-563-2611
611 Lee Avenue West Ext. 53
Osceola, Arkansas 72370

Poison Control Center, Jefferson Hospital, ... 501-535-6800
1515 W. 42nd Avenue Ext. 225
Pine Bluff, Arkansas 71601

Calibrate Your Farm Sprayer

By
GARY HUITINK
Extension Agricultural Engineer

Agricultural chemicals must be applied accurately. An overdose of material wastes expensive chemicals and is likely to be harmful to crops. Likewise, an underdose may fail to get the desired results.

PREPARE SPRAYER

1. Rinse and run clean water into supply tank.
2. Remove and clean all nozzles and screens with old toothbrush and detergent.
3. Start sprayer and flush pump, hoses, and booms with clean water. A pint of ammonia in every 25 gallons of water will help to remove phenoxy herbicides. (Nozzles and strainers removed)
4. Replace screens and nozzles on sprayer.
5. Check all connections for leaks.
6. If sprayer is working properly, calibrate with clean water (no chemical added).

SPRAYER ADJUSTMENT STEPS

Step A. Select nozzle and arrangement.

Step B. Calibrate discharge at field travel speed and pressure.

Step C. Select concentration of tank mix on basis of calibrated discharge, making pressure or speed adjustments for small variations.

For boomless spraying, use the manufacturers' catalog for calibration.

CHECK METHOD USING THE RELATION:

$$G.P.M. = \frac{Gal/A \times M.P.H. \times W^*}{5940}$$

$$Gal/A = \frac{5940 \times G.P.M.}{M.P.H. \times W^*}$$

*W — Nozzle spacing (in boom spraying) or spray swath (in boomless spraying) in inches.

A. SELECT NOZZLE AND ARRANGEMENT

	Nozzle Part No.			Nozzle Discharge Range (Approx. gal/A spaced 40 in)		Comments
	Century	Delavan	Spraying Systems			
FLAT				3 mph, 40 psi	5 mph, 20 psi	Most Century nozzles are 80° spray angle. Delavan nozzles are available in 65, 73, or 80°. Spraying Systems has variety of spray angles shown as first numbers of part no. (only 80° shown)
USES:	4F	LF .67-80	800067	3.3	1.4	
postemergence	5F	LF 1-80	8001	5	2.1	
grain	8F	LF 1.5-80	80015	7.5	3.1	
hay	10F	LF 2-80	8002	11	4.2	
other broadcast	21F	LF 3-80	8003	16	6.3	
application	25F	LF 4-80	8004	22	8.4	
EVEN	1EF	LE 1.5-80	80015E	7.4	3.3	
USES:	2EF	LE 2-80	8002E	10	4.2	Century and Delavan have 80° spray angle only. Spraying Systems has 65°, 80° and 95°.
banded	4EF	LE 3-80	8003E	15	6.2	
preemergence	5EF	LE 4-80	8004E	20	8	
	6EF	LE 5-80	8005E	25	10	
OFF-CENTER				3 mph, 40 psi	5 mph, 30 psi	
USES:	—	LX 2	OC-2	10	5	Adjust nozzle orientation carefully to avoid severe pattern distortion.
postemergence	—	LX 3	OC-3	14	7	
boom extensions	—	LX 4	OC-4	20	10	
for borders	—	LX 6	OC-6	30	15	
				3 mph, 30 psi	5 mph, 20 psi	
FLOODING	—	F1	K1	9	4	Position nozzles accurately because tip size and pressure changes spray angle from 70 to 150°.
USES:	—	F2	K2	17	8	
lay by	—	F3	K3	26	13	
liquid fertilizer	—	F5	K5	44	21	
HOLLOW CONE				5 mph, 60 psi	7 mph, 40 psi	
USES:	2-NC	HB 2	TX2	1.2	.7	
insecticide	3-NC	HB 3	TX3	1.8	1.0	
defoliant	—	HB 4	TX4	2.4	1.5	
	—	HB 6	TX6	3.6	2.0	

For Values Not Tabled:
(using line #1, 800067 nozzle, as an example)

- For nozzle spacing other than 40 in. (for ex. 20 in):
  multiply $\frac{\text{table spacing}}{\text{new spacing}} \times \text{discharge} = \frac{40}{20} \times 3.3 = 6.6$ gal/A
- For speeds not shown (6 mph, for ex. instead of 3 mph)
  multiply $\frac{\text{table speed}}{\text{new speed}} \times \text{discharge} = \frac{3}{6} \times 3.3 = 1.6$ gal/A
- Do not attempt pressure conversions

FLAT

EVEN

OFF-CENTER

FLOODING

HOLLOW CONE

B. CALIBRATE DISCHARGE AT FIELD TRAVEL SPEED AND PRESSURE

OUNCE METHOD

1. A method is to measure a distance in the field for the respective nozzle or row spacing. Select appropriate distance from table:

Row Width (inches)	Distance to Catch Discharge (feet)
40	102
38	107
36	113
34	120
32	127
30	136
28	146
26	157
24	170
22	185
20	204
18	227
16	255
14	291

2. Note the time, in seconds, required to drive the measured distance at the desired throttle setting (speed).
3. Catch the nozzle discharge for the noted time in a measuring cup, baby bottle or other container graduated in fluid ounces. Do this for each nozzle or nozzle group (shoulder and drill on postemergence) on the row width distance you have chosen from the table above to assure equal distribution of chemical.
4. The total discharge per row or nozzle spacing in ounces is equal to the volume or gal/A discharged by the sprayer.
5. Adjust tractor speed or sprayer pressure to modify discharge volume (gal/A) in recommended range. Make another calibration following steps 1-4 after each adjustment. See Step A to change to different nozzle size if desired flow cannot be obtained. Check to see that all nozzles are putting out the same

C. CONCENTRATION OF TANK MIX

CONVERT RECOMMENDED ACTIVE RATE TO TOTAL COMMERCIAL PRODUCT RATE PER ACRE

1. Convert active (technical) to commercial product by dividing chemical container capacity (dry - 16 oz/#; liquid - 128 oz/gal) by the active part.

   Dry ex: (Karmex 80% W.P.)

   $$\frac{16 \text{ (oz/\#)}}{.80 \text{ (active part)}} = \frac{20 \text{ oz of comm. prod.}}{1\# \text{ active}}$$

   Liquid ex: (Karmex DL, 2.8# active/gal)

   $$\frac{128 \text{ (oz/gal)}}{2.8\# \text{ active/gal}} = \frac{45.7 \text{ oz. of comm. prod.}}{1\# \text{ active}}$$

2. Multiply recommended active rate per acre by commercial product per lb. (step 1) to get broadcast rate per acre. (Suppose 1.25 #/A active Karmex 80% W.P. recommended.)

   Dry ex: (Karmex 80% W.P.)

   $$1.25\#/\text{A. active} \times \frac{20 \text{ oz. of comm. prod.}}{1\# \text{ active}} = 25 \text{ oz/A of comm. prod.}$$

3. Reduce broadcast rate to band rate by:

   $$\frac{\text{Band width}}{\text{Row width}} \times \text{Broadcast rate} = \text{comm. prod. per acre used only on desired band}$$

   Dry ex: $\frac{16 \text{ (in. band width)}}{38 \text{ (in. row width)}} \times 25 \text{ oz/A comm. prod. (step 2)} = 10.5 \text{ oz/A applied on 16" band}$

DETERMINE TANK MIX

4. Multiply tank **refill** capacity times comm. product per acre (step 2 or 3) divided by calibrated discharge (gal/A from part B) to get tank mix.

   Dry ex: Suppose 12 gal/A is measured in step B, 10.5 oz/A desired on 16" band, with 300 gal. sprayer.

   $$\frac{\frac{300 \text{ gal}}{\text{tank}} \times 10.5 \text{ oz/A}}{12 \text{ gal/A}} = \frac{262.5 \text{ oz.}}{\text{tank}} = \frac{16.4 \text{ lbs.}}{\text{tank}}$$

- **Wettable powders:**
  —are highly abrasive. Therefore, nylon tips which are more wear-resistant are advised. Brass tips can wear enough in one week to put out an extra gallon for every four desired.
  —must be agitated to keep them in suspension.

- **Keep sprayer calibrated.**

Acknowledgment is given E. J. Matthews, Department of Agricultural Engineering, University of Arkansas for help in the preparation of this leaflet.

Use of products in this leaflet does not constitute a guarantee or warranty of the products named and does not signify that these products are approved to the exclusion of comparable products.

Formulations and Concentrations

FORMULATIONS

The common type of insecticide formulations are wettable powders, emulsifiable concentrates, dusts, solutions, aerosols, baits, granules, and flowables.

Wettable powders (WP) are dry forms of insecticides in which the toxicant is absorbed or adsorbed on powders that can be readily mixed with water because a wetting agent has been added. These form a suspension-type spray which must be kept agitated in a sprayer tank.

Emulsifiable concentrates (EC) contain an insecticide and an emulsifying agent in a suitable solvent. These are diluted with water to form an emulsion and applied as sprays.

Dusts (D) are usually made by diluting the toxicant with finely ground, dried plant materials or minerals. These include wheat, soybean, walnut shells, talc, clay, or sulfur.

Solutions are liquid forms of insecticides which are dissolved in suitable solvents such as petroleum distillates or liquid gas. Oil-base cattle sprays, household sprays, and gas-propelled aerosols are examples of insecticide solutions.

Aerosols are air suspensions of solid or liquid particles of ultramicroscopic size which remain suspended for long periods.

Baits consist of a poison or poisons plus some substances which will attract the insect.

Granules (G) are formed by impregnating the insecticide upon an inert carrier of 30 to 60 mesh particle size.

Soluble powder (SP)—a powder formulation that dissolves in water.

Flowable (Fl)—a liquid or viscous concentrate of suspendible pesticide in water.

Fumigant—a substance or mixture of substances which produce gas, vapor, fume or smoke intended to destroy insects, bacteria, rodents, or other organisms.

TABLE OF WEIGHTS, MEASURES, AND DILUTIONS

Weights

28.35 gram = 1 ounce
16 ounces = 1 pound = 453.6 grams
1 gallon water = 8.34 pounds
1 cubic foot water = 62.4 pounds
1 gallon No. 2 fuel oil = 7 pounds
1 gallon kerosene = 6.7 pounds

Volume and Liquid Measure

3 teaspoons = 1 tablespoon = 14.8 cc
2 tablespoons = 1 fluid ounce = 29.6 cc
8 fluid ounces = 16 tablespoons = 1 cup = 236.6 cc
2 cups = 32 tablespoons = 1 pint = 473.1 cc
2 pints = 64 tablespoons = 1 quart = 946.2 cc
4 quarts = 256 tablespoons = 1 gallon = 3785 cc
128 fluid ounces = 1 gallon = 3785 cc

Land Measure

16½ feet = 5½ yards = 1 rod
66 feet = 4 rods = 1 chain
272¼ square feet = 30¼ square yards = 1 square rod
4356 square feet = 16 square rods = 1 square chain
43560 square feet = 160 square rods = 1 acre
43560 square feet = 10 square chains = 1 acre

LENGTH OF ROW REQUIRED FOR ONE ACRE

Row Spacing	Length or Distance
24 inch	7260 yards = 21,780 feet
30 inch	5808 yards = 12,424 feet
36 inch	4840 yards = 14,520 feet
42 inch	4149 yards = 12,447 feet
48 inch	3630 yards = 10,890 feet

Determining Contents - Standard 55 Gallon Drum

Drum on Side		Drum Upright	
Depth of Liquid in Inches	Volume In Gallons	Depth of Liquid in Inches	Volume In Gallons
1	.89	1	1.7
2	2.4	2	3.4
3	4.4	3	5.2
4	6.7	4	6.7
5	9.3	5	8.6
6	12.0	6	10.3
7	14.8	7	12.0
8	17.8	8	13.8
9	20.9	9	15.5
10	24.0	10	17.2
11	27.2	11	18.9
12	30.2	12	20.6
13	33.4	13	22.4
14	36.5	14	24.1
15	39.5	15	25.0
16	42.5	16	27.5
17	45.3	17	29.3
18	47.9	18	30.9
19	50.3	19	32.7
19.75	52.0	20	34.4
		21	36.1
		22	37.8
		23	39.6
		24	41.3
		25	43.0
		26	44.8
		27	46.5
		28	48.2
		29	49.9
		30	51.6
		30.19	52.0

TRAVEL SPEED CHART

Miles per Hour	Time Required in Seconds to Travel		
	100 Ft.	200 Ft.	300 Ft.
1	68	136	205
2	34	68	102
3	23	46	68
4	17	34	51
5	14	27	41
6	11	23	34
7	10	20	29
8	9	17	26
9	8	15	23
10	7	14	21

1 MPH = 88 feet per minute

1 MPH = 1.466 feet per second

Speed in MPH = $\frac{\text{No. 35-in. steps per minute}}{30}$

Tables of Dilutions for Liquids and Dusts

1. EQUIVALENT QUANTITIES OF LIQUID MATERIALS WHEN MIXED BY PARTS.

Water	1-400	1-800*	1-1600
100 gals.	1 qt.	1 pt.	1 cup
50 gals.	1 pt.	1 cup	½ cup
5 gals.*	3 tbsp.	5 tsp.*	2½ tsp.
1 gal.	2 tsp.	1 tsp.	½ tsp.

* Example: If a recomendation calls for 1 part of the chemical to 800 parts of water, it would take 5 teaspoonfuls in 5 gallons of water to give 5 gallons of a mixture of 1-800.

2. EQUIVALENT QUANTITIES OF DRY MATERIALS (WETTABLE POWDERS) FOR VARIOUS QUANTITIES OF WATER:

Water	Quality of Material					
100 gals.*	1 lb.	2 lb.	3 lb.	4 lb.*	5 lb.	6 lb.
50 gals.	8 oz.	1 lb.	1½ lb.	2 lb.	2½ lb.	3 lb.
5 gals.*	3 tbs.	1½ oz.	1½ lb.	3¼ oz.*	4 oz.	5 oz.
1 gal.	2 tsp.	3 tsp.	1½ tbsp.	2 tbsp.	3 tbsp.	3 tbsp.

* Example: If a recommendation calls for a mixture of 4 lbs. of a wettable powder to 100 gallons of water, it would take 3¼ oz. (approximately 6½ tsp.) to 5 gallons of spray mixture of the same strength.

Note: Wettable pesticide materials vary considerably in density. Therefore the teaspoonful (tsp.) and tablespoonful (tbsp.) measurements in this table are not exact dosages by weight but are within the bounds of safety and efficiency for mixing small amounts of spray.

3. EQUIVALENT QUANTITIES OF LIQUID MATERIALS (EMULSION, CONCENTRATES, ETC.) FOR VARIOUS QUANTITIES OF WATER:

Water	Quantity of Material					
100 gals.*	½ pt.	1 pt.	2 pts.	3 pts.	4 pts.*	5 pts.
50 gals.	4 fl. oz.	8 fl. oz.	1 pt.	24 fl. oz.	1 qt.	2½ pts.
5 gals.	1 tbs.	1 fl. oz.	2 fl. oz.	2½ fl. oz.	3 fl. oz.	4 fl. oz.
1 gal.*	½ tsp.	1 tsp.	2 tsp.	3 tsp.	4 tsp.*	5 tsp.

* Example: If 4 pints of a liquid concentrate is recommended to 100 gallons of water, 4 teaspoonfuls of the chemical to 1 gallon of water will give a mixture of the same strength.

4. TABLE OF POUNDS OF ACTIVE INGREDIENTS PER GALLON, POUNDS PER PINT OF LIQUID, AND THE NUMBER OF PINTS FOR VARIOUS PER ACRE RATES

Pounds of Active ingredients in one gallon of commercial product	Pounds of active ingredients per pint*	Pints of commercial product needed each acre to give the folowing pounds of active ingredient					
		¼ lb./A.	½ lb./A.	¾ lb./A.	1 lb./A.	1½ lbs./A.	2 lbs./A.
2.00	0.25	1 pts.	2 pts.	3 pts.	4 pts.	6 pts.	8 pts.
2.64	0.33	¾	1⅓	2¼	3	4½	6
3.00	0.375	2/3	1-1/3	2	2-2/3	4	5-1/3
3.34	0.42	3/5	1-1/5	1-4/5	2-2/5	3-3/5	4-4/5
4.00	0.50	½	1	1½	2	3	4
6.00	0.75	1/3	2/3	1	1-1/3	2	2-2/3

* 1 pint = 16 liquid ozs. Liquid ozs. may be measured with a discarded prescription bottle, liquid measuring cup, or a baby bottle.

5. TABLE OF AVAILABLE COMMERCIAL MATERIALS IN POUNDS ACTIVE INGREDIENTS PER GALLON NECESSARY TO MAKE VARIOUS PERCENTAGE CONCENTRATION SOLUTIONS*

Pounds of active ingredients in one gallon of commercial product	Pounds of active ingredients per pint*	Liquid ounces of commercial product per one gallon of solution* to make:				
		½%	1%	2%	5%	10%
2.00	0.25	2.68 liq. ozs.	5.36 liq. ozs.	10.72 liq. ozs.	26.80 liq. ozs.	53.60 liq. ozs.
2.64	0.33	2.02	4.05	8.10	20.25	40.50
3.00	0.375	1.78	3.56	7.12	17.80	35.60
3.34	0.42	1.59	3.18	6.36	15.90	31.80
4.00	0.50	1.34	2.68	5.36	13.40	31.80
6.00	0.75	0.89	1.78	3.56	8.90	17.80

* Based on 8.4 pounds per gallon (Weight of Water).

PESTICIDE DILUTION TABLE

(Amount of pesticide formulation for each one gallon of water)

Pesticide Formulation	Percentage of Actual Chemical Wanted								
	.0313%	0.0625%	0.125%	0.25%	0.5%	1.0%	2.0%	3.0%	5.0%
Wettable Powder (WP)									
15% WP	2½ tsp.	5 tsp.	10 tsp.	7 tbsp.	1 cup	2 cups	4 cups	6 cups	10 cups
25% WP	1½ tsp.	3 tsp.	6 tsp.	12 tsp.	8 tbsp.	1 cup	2 cups	3 cups	5 cups
40% WP	1 tsp.	2 tsp.	4 tsp.	8 tsp.	5 tbsp.	10 tbsp.	1¼ cups	2 cups	3¼ cups
50% WP	¾ tsp.	1½ tsp.	3 tsp.	6 tsp.	4 tbsp.	8 tbsp.	1 cup	1½ cups	2½ cups
75% WP	½ tsp.	1 tsp.	2 tsp.	4 tsp.	8 tsp.	5 tsp.	10 tbsp.	1 cup	2 cups
Emulsifiable Concentrate (EC)									
10%-12% EC 1 lb.actual/gal.	2 tsp.	4 tsp.	8 tsp.	16 tsp.	10 tbsp.	⅔ pt.	1⅓ pt.	1 qt.	3¼ pt.
15%-20% EC 1.5 lb. actual/gal.	1½ tsp.	3 tsp.	6 tsp.	12 tsp.	7½ tbsp.	½ pt.	1 pt.	1½ pt.	2½ pt.
25% EC 2 lb. actual/gal.	1 tsp.	2 tsp.	4 tsp.	8 tsp.	5 tbsp.	10 tbsp.	⅔ pt.	1 pt.	1¾ pt.
33%-35% EC 3 lb. actual/gal.	¾ tsp.	1½ tsp.	3 tsp.	6 tsp.	4 tbsp.	8 tbsp.	½ pt.	¾ pt.	1⅓ pt.
40%-50% EC 4 lb.-actual/gal.	½ tsp.	1 tsp.	2 tsp.	4 tsp.	8 tsp.	5 tbsp.	10 tbsp.	½ pt.	4/5 pt.
57% EC 5-lb.-actual/gal.	7/16 tsp.	⅞ tsp.	1¾ tsp.	3½ tsp.	7 tsp.	4½ tbsp.	9 tbsp.	14 tbsp.	1½ cups
60%-65% EC 6 lb. actual/gal.	⅜ tsp.	¾ tsp.	½ tbsp.	1 tbsp.	2 tbsp.	4 tbsp.	8 tbsp.	12 tbsp.	1½ cups
70%-75% EC 8 lb. actual/gal.	¼ tsp.	½ tsp.	1 tsp.	2 tsp.	4 tsp.	8 tsp.	5 tbsp.	7½ tbsp.	13 tbsp.

gal. = gallon lb. = pound pt. = pint tbsp. = tablespoon tsp. = teaspoon

COMMON AND TRADE NAMES OF CHEMICALS MENTIONED IN THIS GUIDE

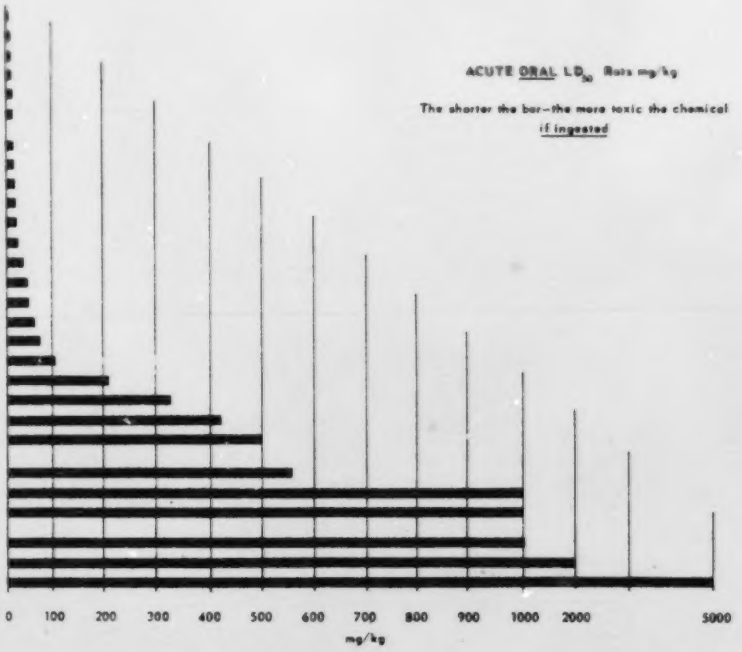
Common Name	Trade Name	Company	Spray Formulations
Abate	Abate	American Cyanamid Company	6 lb. EC
acephate	Orthene	Chevron Chemical Company	75% SP
azinphosmethyl	Guthion	Chemagro Corporation	2 lb. EC, 50% WP
Bacillus thuringiensis	Biotrol	Nutriliate Products, Inc.	
	Dipel	(Thompson Hayward Chem. Co.)	
	Thuricide	Inter. Minerals and Chem. Co.	
carbaryl	Sevin	Union Carbide Corporation	4 lb. EC, 80% & 50% WP
carbofuran	Furadan	FMC Corp., Niagara Chem., Chemagro	80% SP
carbophenothion	Trithion	Stauffer Chemical Company	
chlordane	Chlordane	Velsicol Chemical Corporation	4 & 8 lb. EC
chlordimeform	Galecron, Fundal	Ciba-Geigy, Nor-Am Corp.	4 lb. EC & 90% SP
chlorfenvinphos	Supona	Ciba-Geigy	
chlorpyrifos	Dursban, Lorsban	The Dow Chemical Company	4 lb. EC
ciodrin	Ciovap	Shell Chemical Company	
comite	Omite	Uniroyal Corporation	4 lb. EC
coumaphos	Co-Ral	Chemagro Corporation	4 lb. EC, 25% WP
counter	Counter	American Cyanamid Company	15 G.
crufomate	Ruelene	The Dow Chemical Company	
demeton	Systox	Chemagro Corporation	2 & 6 lb. EC
diazinon	Spectracide	Ciba-Geigy Agri. Chemicals	4 & 2 lb. EC, 50% WP
dichlorvos	Vapona, DDVP	Shell Chemical Company	
dicofol	Kelthane	Rohm and Haas Company	4 lb. EC
dicrotophas	Bidrin	Shell Chemical Company	8 lb. EC
dieldrin	Dieldrin	Shell Chemical Company	1.5 lb. EC, 50% WP
dimethoate	Cygon, De-Fend, Rebelate	American Cyanamid Co., Thompson Hayward, et. al.	2.67 lb. EC
dioxathion	Delnav	Hercules Incorp., et. al.	
disulfoton	Di-Syston	Chemagro Corporation	6 lb. EC
Dowco 213	Plictran	The Dow Chemical Company	
Dyfonate	Dyfonate	Stauffer Chemical Company	4 lb. EC
endosulfan	Thiodan	FMC Corp., Niagara Chem. Corp.	2 lb. EC, 50% WP
endrin	Endrin	Shell Chemical Company	1.6 lb. EC
EPN	EPN	DuPont and Velsicol	2 lb. EC
ethion	Ethion	FMC Corp., Niagara Chem. Corp.	4 & 8 lb. EC, 25% WP
famphur	Famophos, Warbex	American Cyanamid Company	
fensulfothion	Dasanit	Chemagro Corporation	15 G.
fenthion	Baytex, Tiguvon, Entex, Spotton	Chemagro Corporation	4 lb. EC, 9.67 liquid
heptachlor	Heptachlor	Velsicol Chemical Company	
imidan	Imidan Prolate	Stauffer Chemical Company	
lindane	gamma BHC, Isotox	American Cyanamid Company	2 lb. EC
malathion	Cythion	American Cyanamid Company	5 lb. EC
metalkamate	Bux	Chevron Chemical Company	
methaldehyde	Slug and Snail bait	Several companies	
methidathion	Supracide	Ciba-Geigy Agri. Chemicals	4 lb. EC
methoxychlor	Marlate	Ciba-Geigy Agri. Chemicals	50% WP
methomyl	Lannate or Nudrin	DuPont and Shell Chemical	1.8 lb. EC
methyl demeton	Metasystox	Chemagro Corporation	2 lb. EC
methyl parathion	Niran, methyl homolog of parathion	Monsanto Agricultural Div.	4 lb. EC
mevinphos	Phosdrin	Shell Chemical Company	4 lb. EC

EC=Emulsifiable Concentrate
WP=Wettable Powder
SP=Soluble Powder
G=Granular

Common Name	Trade Name	Company	Spray Formulations
monitor	Monitor	Chemagro Corp., and Chevron Chem.	4 lb. EC
monocrotophos	Azodrin	Shell Chemical Company	3.2 Miscible
naled	Dibrom	Chevron Chemical Company	8 lb. EC
parathion	Niran	Monsanto Agri. Division	2 lb. EC
phorate	Thimet	American Cyanamid Company	6 lb. EC
phosalone	Zolone	Rhodia Inc.	
propoxur	Baygon	Chemagro Corporation	70% WP, 1.5 EC
Rabon	Rabon	Shell Chemical Corporation	75% WP
ronnel	Korlan, Trolene	The Dow Chemical Company	2 lb. EC
tetradifon	Tedion	FMC Corp., Niagara Chemical Co.	
toxaphene	Toxaphene	Hercules Inc.	6 lb. EC
trichlorfon	Dipterex, Dylox, Anthon, Neguvon	Chemagro Corporation	80% SP, 4 lb. LS
vendex	Vendex	Shell Chemical Corporation	50% WP
azinophos	Cynem, Nemafos	American Cyanamid Company	

EXAMPLES OF TOXICITY OF CERTAIN INSECTICIDES

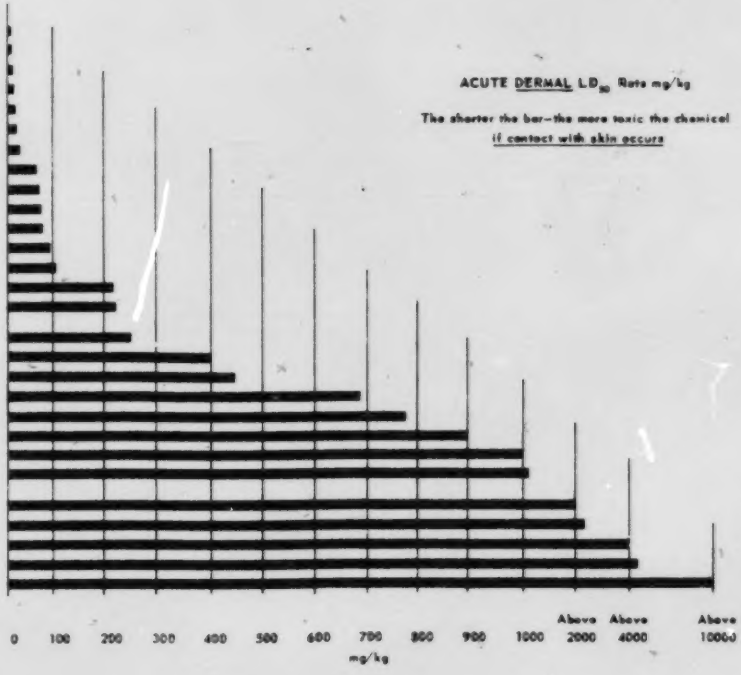
tepp	1.05
phorate (Thimet®)	1.1–2.3
demeton (Systox®)	2.5–6.2
parathion (Thiophos®)	3.6–13.0
mevinphos (Phosdrin®)	3.7–6.1
endrin	5–17.8
carbophenothion (Trithion®)	10–30
azinphosmethyl (Guthion®)	11–13
methyl parathion	14–24
Bidrin®	15–22
endosulfan (Thiodan®)	18–43
phosphamidon (Dimecron®)	23.5
ethion (Nialate®)	27–65
aldrin	39–60
dieldrin	46
diazinon	76–108
toxaphene	80–90
DDT	113–118
dimethoate (Cygon®)	215
chlordane	335–430
naled (Dibrom®)	430
carbaryl (Sevin®)	500–850
trichlorfon (Dylox®) (Dipterex®)	560–630
dicofol (Kelthane®)	1000–1100
malathion	1000–1375
chlorobenzilate	1040–1220
Aramite	2000–3900
tetradifon (Tedion®)	5000–14700



tepp	2.4
phorate (Thimet®)	2.5–6.0
mevinphos (Phosdrin®)	4.2–4.7
parathion (Thiophos®)	7–21
demeton (Systox®)	8–14
endrin	15
carbophenothion (Trithion®)	27–54
dieldrin	60–90
ethion (Nialate®)	62–245
methyl parathion	67
endosulfan (Thiodan®)	74–130
aldrin	98
phosphamidon (Dimecron®)	107–143
azinphosmethyl (Guthion®)	220
Bidrin®	225
oxydemetonmethyl (Meta-Systox®-R)	250
dimethoate (Cygon®)	400
diazinon	455–900
chlordane	690–840
toxaphene	780–1075
lindane	900–1000
dicofol (Kelthane®)	1000–1232
naled (Dibrom®)	1100
trichlorfon (Dylox®, Dipterex®)	>2000
DDT	2510
carbaryl (Sevin®)	>4000
malathion	>4444
tetradifon (Tedion®)*	>4000

> = greater than

* rabbits



The bar graphs above show the relative toxicity to humans of certain common insecticides when exposure is by skin, or when swallowed.

RELATIVE TOXICITIES OF INSECTICIDES AND MITICIDES

Common Name	Trade Name	LD 50 Toxicity*			Relative Toxicity		
		dermal mg/kg	oral mg/kg	inhalation mg/m^3	to birds	to fish	to bees
Biothion, Abate	Biothion, Abate	2,000	2,000	NIA**	low	low	low
Allethrin	Allethrin	11,200	920	NIA	low	NIA	none
Bacillus thuringiensis	Thuricide	NIA	15,000	NIA	none	none	none
Baygon	Baygon	800-1,000	128	NIA	NIA	NIA	NIA
Fenthion	Baytex	330	313	NIA	NIA	NIA	high
Dicrotophos	Bidrin	225	22	NIA	NIA	NIA	high
Carbaryl	Sevin	4,000	850	NIA	slight	high	high
Carbophenothion	Trithion	54	32	NIA	NIA	NIA	low
Chlorobenzilate	Acaraben	5,000	1,130	NIA	slight	NIA	moderate
Chlordane		840	335	2.0	moderate	high	high
Chlorobenside	Mitox	NIA	3,000	NIA	NIA	NIA	none
Ciodrin	Ciodrin	385	125	NIA	NIA	NIA	moderate
Coumaphos	Co-Ral	860	230	NIA	NIA	NIA	moderate
Dimethoate	Cygon, DeFend	400	215	NIA	high	NIA	high
DDVP, Dichlorvos	Vapona	107	80	NIA	NIA	NIA	high

* The higher the LD 50 value the less toxic the chemical
** NIA - no information available

Common Name	Trade Name	LD 50 Toxicity*			Relative Toxicity		
		dermal mg/kg	oral mg/kg	inhalation mg/m^3	to birds	to fish	to bees
DDT		2,510	113	1.0	moderate	high	moderate
Dicofol	Kelthane	1,230	1,100	NIA	moderate	high	none
Diazinon		900	108	NIA	NIA	high	high
Dieldrin		90	46	0.25	high	high	high
Dioxathion	Delnav	235	110	NIA	NIA	NIA	none
Demeton	Systox	14	12	NIA	NIA	NIA	moderate
Naled	Dibrom	1,100	430	NIA	NIA	NIA	high
Dimetilan	Snip	2,000	64	NIA	NIA	NIA	moderate
Trichlorfon	Dylox, Dipterex	2,000	630	NIA	NIA	NIA	none
Disulfoton	Di-Syston	20	12	NIA	NIA	NIA	moderate
Carbofuran	Furadan	11	10	NIA	NIA	NIA	high
Azinphosmethyl	Guthion	220	13	NIA	NIA	NIA	high
Heptachlor		250	165	NIA	NIA	NIA	high
Imidan	Imidan	3,160	216	NIA	NIA	NIA	high
Dinocap	Karathane	9,400	980	NIA	NIA	NIA	NIA

Common Name	Trade Name	LD 50 Toxicity *			Relative Toxicity		
		dermal mg/kg	oral mg/kg	inhalation mg/m^3	to birds	to fish	to bees
Lindane		1,000	88	0.5	moderate	high	high
Malathion	Cythion	4,400	1,375	15.0	high	high	high
Methoxychlor	Marlate	6,000	6,000	15.0	slight	high	none
Meta-Systox	Meta-Systox	250	65	NIA	NIA	NIA	moderate
Methyl Parathion		67	14	NIA	NIA	NIA	high
Ethion	Nialate	245	65	NIA	NIA	NIA	none
Parathion		21	13	NIA	NIA	NIA	high
Mevinphos	Phosdrin	4.7	6	NIA	NIA	NIA	high
Pyrethrum		1,800	200	NIA	NIA	NIA	none
Rotenone		3,000	132	NIA	NIA	high	none
Ruelene	Ruelene	490	635	NIA	NIA	NIA	NIA
Tetradifon	Tedion	10,000	14,000	NIA	NIA	high	none
Endosulfan	Thiodan	245	65	NIA	NIA	high	none
Phorate	Thimet	6	2.3	NIA	NIA	NIA	moderate

BEEF CATTLE EXTERNAL PARASITES

Pest	Material and Formulation	Minimum Days from Last Application to Slaughter	Amt. per Animal or Area if Appropriate	Method of Application	Remarks
	POUR-ONS (also control lice, some reduction of horn flies)				
CATTLE GRUB Systemics for grub control should be applied before Oct. 15 in Arkansas. Treatment later than Oct. 15 may cause toxic reactions in cattle from dying grubs. If grubs are in back during winter months, use rotenone dust 2.5%.	coumaphos(Co-Ral) 4% ready-mixed (also controls horn flies and lice)	0	½ fluid oz. per 100 lbs. body weight.	Pour on evenly along animal's backline with a marked dipper.	Only a single application is needed per season.
	famphur(Warbex) 13.2% ready-mixed (also controls lice)	35	½ fluid oz. per 100 lbs. body weight. Use no more than 4 ozs. on cattle over 800 lbs.	Pour on evenly along animals' backline with a marked dipper.	Follow label directions and precautions.
	Ruelene 12 R ready-mixed (also controls horn flies & lice)	7	½ fluid oz. per 100 lbs. body weight. Use no more than 5 ozs. per animal.	Pour on evenly along animal's backline with a marked dipper.	A single treatment is effective for control of grubs and lice.
	Neguvon 8% ready-mixed (also controls lice)	21	½ fluid oz. per 100 lbs. body weight. Use no more than 4 ozs. per animal.	Pour on evenly along animal's backline with a marked dipper.	Follow label directions and precautions.
	Prolate 4% ready-mixed (also controls horn flies)	21	1 fluid oz. per 100 lbs. body weight. Use no more than 8 ozs. per animal.	Pour on evenly along animal's backline with a marked dipper.	Do not apply any pour-on in conjunction with oral drenches, phenothiazine or other organic phosphate insecticide.
	Tiguvon 3% ready-mixed (also controls horn flies & lice)	35	½ fluid oz. per 100 lbs. body weight.	Pour on evenly along animal's backline with a marked dipper.	Follow label precautions.
	Fenthion (20% Spotton)	45	follow label directions.	Use applicator gun.	Follow label precautions.
	Ronnel (Korlan 2) (for lice only) Mix with water	0	follow label directions	Use dipper	Will not control grubs - can be used anytime of the year.
	SPRAYS (also control lice)				
	coumaphos (Co-Ral) 1 application	0	Depends on animal size or hair coat.	Wet skin thoroughly. Use 250 lbs. per square in. pressure.	Apply 12 lbs. 25% WP per 100 gals./water, or 2 gals. 11.6% EC
	Ruelene 1 application	7	Use a maximum of 1 gal. spray mixture per animal.	Wet skin on back and sides at pressure of 200-400 psi	Mix 1½ gal. Ruelene 25E/100 gals. water.
	Neguvon 80% SP 1 application	14	Apply solution for complete wetting to run-off.	Spray thoroughly.	Mix 10 lbs. Neguvon 80% SP/100 gals. water.

BEEF CATTLE EXTERNAL PARASITES (Cont.)

Pest	Material and Formulation	Minimum Days from Last Application to Slaughter	Amt. per Animal or Area if Appropriate	Method of Application	Remarks
		FEED ADDITIVES			
CATTLE GRUB (Cont.)	Ronnel (Trolene, Rid-Ezy, and Steer-kleer)	10	Read label directions carefully.	Different formulations may be mixed in feed or fed free-choice as block or granules.	Do not feed to sick animals or animals under stress.
		DUST BAGS			
	(Dust bags have shown an indication of good lice control when left in place during winter monshs. Install in gates, doorways, loafing areas, etc.)				
HORN FLY LICE (aids in control of face flies)	crotoxyphos (Ciodrin) 3% dust	0	Self treatment	No mixing necessary.	Keep bags in place during winter for lice control.
	coumaphos (Co-Ral) 1-5% dust	0	Self treatment	No mixing necessary.	Do not contaminate feed or water.
	Methoxychlor 10% dust	0	Self treatment	No mixing necessary.	Keep bags in place during winter for lice control.
	phosmet (Prolate) 5% D	21	Self treatment	No mixing necessary.	Same as above.
	Malathion 5% D	0	Self treatment	No mixing necessary.	Same as above.
	Rabon 3% D	0	Self treatment	No mixing necessary.	Same as above.
		BACKRUBBERS			
	(Backrubbers help prevent lice infestations.) Install cable in gates, doorways, loafing areas, etc. at first sign of pest. Do not use motor oil. Use only #2 fuel oil or diesel oil.				
HORN FLY LICE (aids in control of face flies)	Toxaphene 5% in oil	28	1 gal. solution per 20 ft. cable	Saturate backrubber.	Ready-to-use oil solution. Do not use on animals less than 3 mo.
	Ronnel (Korlan) 1% in oil	0	1 gal. solution per 20 ft. cable	Saturate backrubber.	1 qt. of 24E in 7 gals. oil.
	Methoxychlor 5% in oil	0	1 gal. solution per 20 ft. cable	Saturate backrubber.	Use 1 gal. of 2 lbs. EC in 4 gals. oil
	Malathion 2% in oil	0	1 gal. solution per 20 ft. cable	Saturate backrubber	Use 2½ pts. 57% E in 4 gals. oil
	Delnav 1.5% in oil	0	1 gal. solution per 20 ft. cable	Saturate backrubber	Use 1 qt. 33% in 5 gals. oil
	Ravap 1.25% in oil	0	1 gal. solution per 20 ft. cable	Saturate backrubber	Ready-to-use.

BEEF CATTLE EXTERNAL PARASITES (Cont.)

Pest	Material and Formulation	Minimum Days from Last Application to Slaughter	Amt. per Animal or area if Appropriate	Method of Application	Remarks
			BACKRUBBERS (Cont.)		
HORN FLY LICE	Ciovap (10 / 2.5)% EC	0	1 gal. solution per 20 ft. cable	Saturate backrubber.	Use 4 cups in 4 gals. oil.
	coumaphos (Co-Ral) 1% in oil	0	1 gal. solution per 20 ft. cable	Saturate backrubber.	Use 1 qt. of 11.6% EC in 3 gals. oil.
			DIPS		
GRUBS HORN FLY LICE TICKS	coumaphos (Co-Ral) 0.06%	0	Wet animal thoroughly	Dipping vat.	2 lbs. 25% WP or ½ gal. of 11.6% EC per 100 gals. water.
SCREWWORMS (maggots in wounds)	Korlan - pressurized livestock spray can			Hold can 3 inches from wound. Spray directly into and around wound. Repeat at 5 to 7 day intervals as needed.	
	Co-Ral 5% Dust			Ready-to-use. Apply to infested wound and surrounding area. Repeat when necessary.	
	Lindane 3% Smear			Formulated with other ingredients. Apply to infested wound weekly until healed.	
			SPRAYS		
	(One application of one of the following may be sufficient for lice. If live lice are present after 2 weeks, apply a second treatment.)				
HORN FLY, LICE (These sprays will also control ticks and aid in control of face flies)	coumaphos (Co-Ral) 11.6% EC or 25% WP	0	Depends on animal size and hair coat for lice. Use 1 or 2 qts. per animal for horn fly. Don't spray animals under 3 mo.	Spray animal thoroughly for lice. Apply spray to back area every 3 weeks for horn fly.	Use 2 lbs. Co-Ral 25% WP or 4 qts. 11.6% EC in 100 gals. water for lice. Use only 2 qts. of 11.6% EC for horn fly.
	Malathion 25% WP or 57% EC	0	Depends on animal size and hair coat for lice. Use 2 qts. of spray for horn fly.	Spray animal thoroughly for lice. Apply spray to back area for horn fly.	Use 1 gal. Malathion 57% EC or 16 lbs. 25% WP/ 100 gals. water. Do not use on calves less than 1 month.
	Rabon 50% WP or 24% EC	0	Use between 1/2 and 1 gal. of spray per animal.	Spray face to aid in face fly control. Spray as directed above for other pests.	Mix as directed on label for specific pest.

BEEF CATTLE EXTERNAL PARASITES (Cont.)

Pest	Material and Formulation	Minimum Days from Last Application to Slaughter	Amt. per Animal or Area if Appropriate	Method of Application	Remarks
			SPRAYS (Cont.)		
HORN FLY, LICE (These sprays will also control ticks and aid in control of face flies).	Methoxychlor 50% WP or 25% EC	0	Depends on animal size and hair coat for lice. Use 2 qts. of spray per animal for horn fly.	Spray animal thoroughly for lice. Apply spray to back area for horn fly.	Use 8 lbs. 50%WP per 100 gals. water or 2 gals. 25% EC/100 gals. water. May take two sprays to control lice. Spray no more than once every 3 wks. for horn fly.
	Ronnel (Korlan) 25% WP or 24% EC	7	Depends on animal size and hair coat for lice. Use 2 qts. of spray per animal for horn fly.	Spray animal thoroughly for lice. Apply spray to back area for horn fly.	Use 2 gals. 24% EC/100 gals. water, or 8 lbs.25% WP/100 gals. water. Do not reapply within 2 weeks.
	Dioxathion (Delnav) 30% EC	0	Depends on animal size and hair coat for lice. Use 2 qts. of spray per animal for horn fly.	Spray animal thoroughly for lice. Apply spray to back area for horn fly.	Use ½ gal. 30%EC/ 100 gals. water. Do not repeat at less than 2 wk. intervals. One spray will probably control lice.
	Toxaphene 40% WP or 60% EC	28	Depends on animal size and hair coat for lice. Use 2 qts. of spray per animal for horn fly.	Spray animal thoroughly for lice. Apply spray to back area for horn fly.	Use 10 lbs. 40%WP or 6 pts. 60%EC/ 100 gals. water. Apply every 3 wks. or as needed for horn fly. Two applications may be required to control lice.
	Ciovap (10 + 2.5)% EC	0	Use 2 pts. per large animal.	Spray animal thoroughly for lice. Apply spray to back area for horn fly.	Use 2 gals. EC/ 25 gals. water.
	Ravap (23 + 5.7)% EC	0	Use 1/2 to 1 gal. of spray per animal.	Same as above.	1 pt./10 gals. water for hornflies and lice. 1 pt./6 gals. water for ticks.

FLY CONTROL ON LACTATING DAIRY COWS

Insecticides	Mixing Directions	Remarks and Precautions
SPRINKLE-ON DUSTS (horn flies, flies around face)		
Ciodrin 3% or 5% D Malathion 4% D Methoxychlor 50% WP (Marlate)	2 Tbs./head 4 Tbs./head 1 Tb./head	Apply at first sign of pest. Dust only after milking. Rub dust lightly into hair on poll, neck, back and upper sides. Repeat Ciodrin or methoxychlor applications every 3-4 weeks, or malathion every 10-14 days. Do not use malathion within 5 hours of milking.
DUST BAGS (horn flies, flies around face)		
Ciodrin 3% D Co-Ral 1% or 5% D Pyrethrins 0.075% Rabon 3% D	-- --	Install bags across gate or door where cows leave milking parlor. Do not hang bags over feed, mineral or water troughs. No restrictions when used as recommended.
MIST SPRAYS (horn flies, stable flies, flies around face)		
Ciodrin 1.1 lb./gal. EC Vapona 2 lb./gal. EC Ciovap 1.23% OS Ciovap 12.5% EC pyrethrins 0.3% OS	1 pt./6 pts. water 1 pt./3 gal. water ready-to-use 1 qt./3 gal. water ready-to-use	Do not use more than 2 fluid ounces of finished spray per head per day of Vapona, Ciodrin or Ciovap ready-to-use. See labels for other restrictions.
BACKRUBBERS (horn flies, also aid in lice and tick control)		
Co-Ral 1 lb./gal. EC Ciovap 12.5% EC Pyrethrin 0.1% Korlan 24% EC	1½ cups/gal. oil 1 cup/gal. oil (also comes ready-to-use) ready-to-use 6/10 cup/gal. oil	Use only diesel oil or No. 2 fuel oil to dilute concentrates. Use 1 gal. of oil solution per 20 ft. of backrubber. Retreat backrubbers weekly. Do not treat calves under 6 months old.

NOTE: For control of flies around the face, the insecticides must be applied to the face. Facerubbers charged with oil solutions of 1% Ciodrin, 1% Co-Ral, or 1% Ciovap placed over mineral boxes is one means of treating the face. Dust bags containing 3% Ciodrin dust can be used in the same way. Any of the sprays mentioned above are also effective, but particular attention should be given to the head and shoulders of the animal.

LICE AND TICK CONTROL ON LACTATING DAIRY COWS

Insecticides	Mixing Directions	Remarks and Precautions
Co-Ral 25% WP	1/4 lb./25 gals. water	Complete wetting to run-off. Repeat as necessary.
Ciodrin 1.1 lb./gal. EC	2 pts./12 gals. water	Spray thoroughly. Do not use more than once per week. Do not treat calves under 6 months old.
3% D	use as is	Use 2 heaping Tbs./head. Repeat in 3-4 weeks. Do not treat calves under 6 months old.
Ciovap 12.5% EC	1 qt./12 gals. water	Repeat every 7 days if needed. Use up to 1 gal. spray/head.
1.23% Oil solution	ready-to-use	Use 3-3½ oz./head and repeat in 2 weeks if needed.
Methoxychlor 50W (Marlate)	use as a dust	Use 1 rounded Tb./head

NOTE: Ciodrin 3% dust bags and Korlan backrubbers also aid in control of lice. Co-Ral spray and Ciodrin dust arefor lice control only. Double the strength of the Ciodrin spray for tick control but do not repeat within 7 days.

FLY CONTROL IN DAIRY BARNS

Insecticides	Rate	Remarks
Malathion 57% EC	5 Tbs. + 7 Tbs. sugar/gal. water/1,000 sq. ft.	Remove animals from barn before spraying. Allow at least 4 hours for spray to dry before allowing cows to return to the barn. Do not contaminate feed, water, or milking utensils. These same materials may be used in fly resting areas outdoors. For control of flies in breeding areas such as manure, use any of these materials except methoxychlor according to label directions. Spray to the point of run-off.
Vapona 2 lbs./gal. EC	1/3 cup/gal. water/4,000 sq.ft.	
Methoxychlor 50% WP	3 cups (2/5 lb.)/gal. water/ 1,000 sq. ft.	
Methoxychlor 25% EC	4/5 pt./gal. water/1,000 sq.ft.	
Cygon 2 lb./gal. EC Ravap (2.05) lb./gal. EC	2 qt./10 gals. water 12 Tbs./gal. water/500-1,000 sq. ft.	
Rabon 2 lb./gal. EC	6 oz./gal. water/500-1,000 sq. ft.	
Korlan 25% EC	5 1/3 oz. + 3 oz. sugar/gal. water/500-1000 sq. ft.	
Baytex 45% EC	3 gals./100 gals. water	Apply 1 gal./500 sq. ft. Lasts 4-6 weeks.

FLY CONTROL IN MILK ROOMS

Insecticides	Rate	Remarks
Vapona resin strip	1 strip/1,000 cu. ft. of enclosed area	Hang Vapona resin strips as directed on the label. Apply malathion and ronnel liquid baits with a brush to floors, windows, doorways and other places where flies congregate. Do not contaminate milk or equipment.
Malathion 57% EC	5 Tbs. + 7 Tbs. sugar + 1 gal. water	
Korlan 24% EC	5/8 pt. + 7 Tbs. sugar + 1 gal. water	

WP = wettable powder; EC = emulsifiable concentrate; Tbs. = tablespoon

CATTLE GRUB CONTROL
WINTER TREATMENTS FOR LACTATING COWS

(No systemic insecticides at grub control rates are currently approved for use on lactating cows.)

Treat cows giving milk once a month for 3 months beginning December 15.	Rotenone 5% dust (Sprays will help clean up lice).	Sprinkle dust on back of animal and rub into hair or spray with 7½ lbs. cattle grub dust in 100 gals. water at 400 lbs. pressure.	Exempt from tolerance. Effective only after grubs have cut holes in back.

CATTLE GRUB CONTROL (AIDS LICE CONTROL)
LATE SUMMER OR FALL TREATMENT FOR DRY COWS ONLY

Treat dry cows and heifers from July through October 15 prior to freshening.	Co-Ral (coumaphos) .25% (8 lbs. 25% WP to 100 gals. water).	Spray to wet 2-3 times at monthly intervals. Also controls horn fly and ticks.	Don't use closer than 14 days of freshening.
	OR		
	Co-Ral (coumaphos) .375% (12 lbs. 25% WP or 12 qts. of 11.6% EC to 100 gals. water).	Spray to wet; one application. Apply as a high pressure spray (250 to 350 psi.) to wet skin.	Don't use closer than 14 days of freshening.
	OR		
	Co-Ral (coumaphos) 1% pour-on solution. Ready-to-use.	Apply ½ fluid ounce per 100 lbs. animal body weight. Apply evenly along backline.	Don't use closer than 14 days of freshening. Don't repeat treatment.
	OR		
	Ruelene .25% (1 gal. 25% EC to 100 gals. water).	Spray to wet 2-3 times at monthly intervals. Also controls horn fly and ticks.	Don't use closer than 3 days of freshening.
	OR		
	Ruelene .5% (2 gals. 25% EC to 100 gals. water).	Spray to wet; one application. Apply as a high pressure spray (250 to 350 psi.) to wet skin.	Don't use closer than 3 days of freshening.
	OR		
	Ruelene 12R pour-on solution. Ready-to-use.	Pour ½ fluid ounce per 100 lbs. animal body weight along backline. Do not apply more than 5 ounces per animal.	Don't use closer than 3 days of freshening.
	OR		
	Neguvon (trichlorfon) 8% pour-on solution. Ready-to-use.	Pour ½ fluid ounce per 100 lbs. animal body weight along backline.	Don't use closer than 7 days of freshening. Don't repeat treatment.
	OR		
	Warbex (famphur) 13.2% pour-on solution. Ready-to-use.	Pour 1 fluid ounce per 200 lbs. animal body weight along backline. Do not apply more than 4 ozs. per animal.	Don't use closer than 21 days of freshening. Don't repeat treatment.
	OR		
	Tiguvon (fenthion) 3% pour-on solution. Ready-to-use.	Pour ½ fluid ounce per 100 lbs. animal body weight along backline.	Don't use closer than 28 days of freshening. Don't repeat treatment.
	Spotton 20% ready-to-use.	Use applicating gun as directed on label.	Do not use on dairy cattle of breeding age.

DO NOT USE THE FOLLOWING INSECTICIDES ON DAIRY FARMS FOR ANY PURPOSE: aldrin, BHC, chlordane, DDT, TDE, dieldrin, endrin, heptachlor, lindane, thiodan, toxaphene.

POULTRY EXTERNAL PARASITES

LITTER TREATMENTS

Pests	Insecticides	How to Mix	Application	Precautions
fleas, lice and mites, including northern fowl mites	Carbaryl (Sevin) 5% dust	No mixing necessary.	1 lb. per 40 sq. ft.	Avoid direct contamination of eggs or nest litter. Do not contaminate feed or drinking water. Do not house bird in treated houses within 7 days of slaughter.
	Coumaphos (Co-Ral) 0.5% dust		2 lbs. per 40 sq. ft.	Do not use more than once per week. Do not dust within 10 days of vaccination or other stress.
	Malathion 4% or 5% dust		1 lb. per 50 sq. ft.	0 days
	Rabon 50% WP		Apply 2.5 ozs./100 sq. ft. as a dry dust. Treat evenly & thoroughly.	
	Rabon 0.5%	8 lbs. of 50% WP per 100 gals. of water.	1-2 gal. per 1,000 sq. ft. Spray evenly for penetration to litter surface. Spray also thoroughly to walls, roosts, cracks, crevices, & interiors. Spray birds lightly.	
	Ravap (23 + 5.7)%	Mix EC with water as directed on label.	Same as for Rabon	

POULTRY EXTERNAL PARASITES

CAGED LAYER TREATMENTS (DIRECTLY ON BIRDS)

Pests	Insecticides	How to Mix	Application	Precautions
Lice & Mites Including northern fowl mite	carbaryl (Sevin) 5% dust	No mixing necessary.	Dust birds thoroughly with hand operated crank duster 1 lb./100 birds	Do not use more often than once every 4 weeks Avoid direct contamination of eggs. Do not contaminate feed or drinking water. 7 days between last application and slaughter.
	carbaryl (Sevin) 0.5%	8 lbs. 50% WP or 5 lbs. 80% WP per 100 gals. water.	Spray directly on birds; 1 gal./100 birds Repeat in 4 weeks if needed.	
	coumaphos (Co-Ral) 0.5% dust	No mixing necessary.	Dust birds thoroughly; 1 lb./100 birds	Do not use within 10 days of vaccination or other medication. 0 days between last application and slaughter.
	coumaphos (Co-Ral) 0.25%	8 lbs. 25% WP or 2 gals. 11.6% EC per 100 gals. water.	Spray directly on birds; 1 gal./100 birds	
	Malathion 4% or 5% dust	No mixing necessary.	Dust birds thoroughly; 1 lb./100 birds.	0 days between last application and slaughter.
	Malathion 0.5% spray	6½ pts. of 57% EC or 16 lbs. of 25% WP in 100 gals. water.	Spray directly on birds; 1 gal./100 birds.	
	Rabon 0.5%	8 lbs. of 50% WP per 100 gals. of water.	1 gal. per 100 birds. Apply directly to birds, spray vent and fluff areas from below. Repeat when necessary.	Do not repeat more often than every 14 days.
	Ravap (23 + 5.7)% EC	Mix as directed on label.	1 gal. per 100 birds. Apply directly to birds. Spray vent and fluff areas from below.	Do not repeat more often than every 14 days.

FLY CONTROL IN POULTRY HOUSES

LARVICIDES

Pests	Insecticides	How to Mix	Application	Precautions
Fly maggots in droppings under caged layers	Dimethoate (Cygon or DeFend) 1%	2½ gals. of 23.4% EC per 50 gals. of water (0.5%)	Apply to droppings as coarse spray at rate of 3 gals. per 500 sq. ft.	Remove birds from buildings before spraying with dimethoate. Do not contaminate feed, poultry litter or feed troughs. Do not apply to poultry or cages. Well-timed spot treatment of heavy maggot infestations should eliminate the need for "blanket" applications on a routine basis. Repeat applications as needed. Sanitation such as: clean up of spilled feed outside poultry house should not be overlooked. KEEP MANURE DRY. STOP WATER DRIPS. MOW WEEDS NEXT TO HOUSE.
	Ronnel (Korlan) 2%	4 gals. of 23.4% EC per 50 gals. of water (2%)		
	Supona (Coopers' Residual Surface Spray & Larvicide)	3 qts. of 21% EC per 50 gals. of water for cleanup. 1 qt. of 21% EC per 50 gals. for maintenance application.	Apply to droppings as coarse spray at rate of 1 gal. per 25 sq. ft.	
	Rabon 1%	4 gals. of 24.3% EC or 16 lbs. of 50% WP per 100 gals. of water.	Apply to droppings at rate of 1 gal. per 100 sq. ft.	
	Ravap 1%	Mix 1 gal. EC in 25 gals water.	Apply 1 gal. per 100 sq. ft. of manure	
	Golden malrin liquid (contains dimethoate and Vapona)	Mix 1 gal. EC in 20 gals. water	Apply 1 gal. per 100 sq. ft. of manure.	Not necessary to remove poultry before spraying.

BAITS

Adult flies	Vapona Malathion Dibrom (Fly Killer D) Ronnel (Korlan) Dipterex	Commercially prepared liquid and/or dry baits of these insecticides are usually available. Use according to manufacturer's directions. Producers can make their own baits, dry or liquid, by following directions on the label of some concentrate formulations. When using baits, do not contaminate equipment, feed or water. Keep baits out of reach of birds, pets and children.

FLY CONTROL IN POULTRY HOUSES

SPACE TREATMENT RECOMMENDATIONS

Pests	Insecticides	How to Mix	Application	Precautions
Adult flies; all species found in poultry houses.	Pyrethrins, 0.1 to 0.25% plus synergist, 1.0 to 2.5%	Follow directions on label.	Saturate the atmosphere with electric fogging gun for quick kill when adult flies are numerous.	Follow manufacturer's directions, ESPECIALLY FIRE HAZARD PRECAUTIONS. Can be used while birds are in house.
	Dichlorvos (Vapona) 20% resin strips	No mixing necessary.	Suspend from ceiling as directed on label. One to 1,000 cu. ft.	Do not place over feed or water. Keep out of reach of animals and children.
	Vapona 1%	Ready-to-use	Apply 1 pt. per 8,000 cu. ft. as mist or fog.	Reduce air movement as much as possible.

RESIDUAL SURFACE SPRAYS[1/]

Adult flies; especially house flies	Malathion 2.5%	4 gals. of 57% EC per 100 gals. water	Not more than 2 gals. per 1,000 sq. ft. or to point of run-off.	Birds do not have to be removed from house while spraying. Do not contaminate feed or water. Do not spray birds directly.
	Naled (Dibrom) 0.3% (Fly Killer D)	10 ozs. of 41% EC per 100 gals. water		
	Ronnel (Korlan) 1% (also controls darkling beetles)	4 gals. of 25% EC per 100 gals. of water.		
	Rabon 1%	4 gals. 24.3% EC or 16 lbs. 50% WP per 100 gals. of water	1 gal. per 1,000 sq. ft.	No need to remove birds from house. Do not apply to chickens.

[1/]For treatment of inside and outside walls and ceilings to kill flies that rest on the treated surfaces.

TURKEY CHIGGERS ON RANGE

	chlorpyrifos (Dursban) 25% WP	Use 16 lbs. WP to 100-150 gals. of water for each acre to be treated.	Apply just prior to placing turkeys. For infested birds spray soil in pen. Allow 3 weeks for lesions to heal prior to marketing.	Do not spray on turkeys, feeders or waterers. Treatment limited to 2 applications at intervals of not less than 4 weeks.

SWINE EXTERNAL PARASITE CONTROL

Pest	Insecticides	How to Mix	Minimum Days from last appl. to slaughter	Precautions and Remarks
Lice*	Ciovap (10/2.3)% EC	2½ pt./16 gal. water	--	Spray thoroughly. Repeat after 2 wks.
	Coumaphos (Co-Ral) 25% WP	½ lb./25 gal. water	--	See label restrictions & precautions.
	Ronnel (Korlan) 5% G	½ lb./100 sq. ft. of bedding	14	Do not reapply Korlan within 2 wks. Do not apply Korlan in conjunction with other systemic insecticides. Withdraw Korlan treated bedding 14 days before slaughter.
	Ronnel (Korlan) 25% EC	1 qt./25 gal. water	14	Spray animals thoroughly. Do not re-treat within 2 weeks.
	Toxaphene 60% EC	1 1/4 cups/10 gal. water	28	
	Dioxathion (Delnav) 30% EC	1 qt./25 gal. water	14	Do not retreat within 14 days. Do not use on animals under 3 mos. of age.
	Methoxychlor (Marlate)50%WP Methoxychlor (Marlate)25%EC	2 lb./25 gal. water 2 qt./25 gal. water	--	Spray thoroughly. Repeat after 2-3 weeks if needed.
	Malathion 57% EC Malathion 25% WP	1 qt./25 gal. water 4 lb./25 gal. water	--	Do not use on animals less than 1 mo. old.
	Rabon 3% dust or 50% WP	Mix spray as directed on label	0	Spray or dust every 2 weeks if necessary.
Mange Mites	Lindane 20% EC	1 cup/25 gal.	30	Use lindane in severe cases only. Pump pressures of 150-250 psi needed to properly control mange. These pesticides also control lice. Do not treat animals less than 3 mo. old with lindane or less than 1 mo. old with malathion. Keep hogs out of sun or wind for a few hours after treatment.
	Malathion 57% EC	1 qt./25 gal.	0	
	Toxaphene 60% EC	1 1/4 cups /10 gal.	28	

FLY CONTROL IN SWINE BARNS (NOT ON ANIMALS)

Flies on Premises	Ravap (2/C.5)lb./gal. EC	12 Tbs./gal	Animals may be present when spraying but do not spray animals directly. Do not contaminate food or drinking water. Wet fly resting areas thoroughly.
	Rabon 2 lb./gal. EC	12 Tbs./gal	
	Malathion 57% EC	1 qt./10 gal. + 4 cups sugar	
	Ronnel (Korlan) 24% EC	3 pt./10 gal.	
	Vapona 2 lb./gal. EC	1 pt./6 gal.	
	Dimethoate (Cygon)23.4% EC	5 cups/10 gal.	Remove animals from spray area until spray dries. Spray fly resting areas to point of run-off.
	Dipterex 1% sugar bait	Apply as purchased	Follow label instructions.

WP=wettable powder; EC=emulsifiable concentrate; pt.=pint; lb.=pound; gal.=gallon; qt.=quart; Tbs.=tablespoon

*Ciodrin, lindane, malathion, methoxychlor or toxaphene dusts may also be used for lice control.

HORSES

PEST	Insecticide	Mixing and Application	Precautions and Remarks
Bots	Trichlorfon (Anthon)	Mix with feed. Use one 5 gram pkg. per 250 lb. body weight. Withdraw all feed 12-18 hours prior to treatment	Trichlorfon - Single oral dose in feed 1 month after killing frost. Do not treat sick horses, colts less than 4 months old or mares in last month of pregnancy. Do not treat horses to be used for food. Do not repeat within 30 days.
	Dichlorvos (Eguigard)		For use only by or upon order of licensed veterinarian.
	Sponge animal with warm water 30 days after killing frost	Water should be warm enough to immerse hand without discomfort. Sponge animals where eggs are present.	Rub animal firmly and keep water warm (about 120°F). Worms will hatch and die when wet thoroughly with warm water.
Horn flies Lice Ticks	Coumaphos (Co-Ral) 0.06% spray	Mix 1 oz. 25% WP or 2 ozs. 11.6% EC in 3 gals. water. Apply as a spray when pests are present.	Do not treat animals less than 3 months old. Do not treat sick or stressed animals. Do not use in conjunction with oral drenches or other internal medications.
Horn flies Lice	Malathion 0.5% spray	Mix 4 ozs. 57% EC per 3 gals. water. Apply thoroughly when pests are present.	Do not contaminate feed, water, water utensils or feed troughs. Do not use on slaughter animals.
Horn flies Stable flies Lice Ticks	Carbaryl (Sevin) 0.5% spray	Mix 4 ozs. 50% WP per 3 gals. water. Apply 1-4 qts. per animal as a spray when pests appear.	Do not apply more than once every four days.
Horn flies Stable flies Horse flies Mosquitoes Black flies Deer flies Stable flies	Rabon 1% liquid for horses OR Rabon 2% Gel OR Saddle-Mate Wipe-N-Spray	Follow directions on container. Wipe on or spray.	Safe to use. Nervous animals may be sponged. Use rubber gloves when sponging. Kills and repels.

EXTERNAL PARASITES ON SHEEP AND GOATS

(Do not treat animals under 3 months old, dairy goats or sick animals)

Insect	Time of Treatment	Insecticide[a]	Dosage	Application	Restrictions[b]
Fleece-worms (wool maggots)	Spring and Summer	Coumaphos (Co-Ral) 25% WP	1 lb./25 gal.	Spray thoroughly	Treat animals 3-6 months old lightly only. Do not use 15 days before slaughter. Read insecticide label for further restrictions.
		Ronnel(Korlan)25%WP Ronnel(Korlan)24%EC	4 lb./25 gal. 2 qt./25 gal.		Do not use 28 days before slaughter.
		Lindane 3% smear EQ 335	1 part to 9 parts water	Wet infested area and 3 in. around it.	No waiting days to slaughter.
(c) Lice, Keds, and Ticks	Fall and Winter	Coumaphos(Co-Ral) 25% WP	1 lb./25 gal.	Repeat after 2-3 weeks if needed.	See above restrictions for coumaphos.
		Ciovap (10/2.5)% EC	2½ pt./16 gal.		Do not repeat CioVap spray within 1 week.
		Ronnel(Korlan)25%WP Ronnel(Korlan)24%EC	2 lb./25 gal. 1 qt./25 gal.		Do not use ronnel within 28 days of slaughter.
		Malathion 57% EC Malathion 25% WP	3½ cups/25 gal. 4 lb./25 gal.	Spray thoroughly. Repeat every 2-3 weeks if needed.	Do not use on animals less than 1 month old. No waiting days to slaughter.
		Methoxychlor(Marlate) 25% EC	2 qt./25 gal.		
		Methoxychlor(Marlate) 50% WP	2 lb./25 gal.		
Screw-worm	Summer, if wounds are infested	Ronnel(Korlan)24%EC Ronnel(Korlan)25%WP	2 qt./25 gal. 4 lb./25 gal.	Spray thoroughly.	Do not use within 28 days of slaughter.
		Coumaphos (Co-Ral) 25% WP	2 lb./25 gal.	Spray thoroughly.	Do not use within 15 days of slaughter.
		Lindane 3% smear	Ready-to-use	Brush or smear on and around wound twice weekly, then weekly until healed.	No waiting days to slaughter.
		Toxaphene 2% smear			

(a) Use livestock formulations only.

(b) Ronnel is registered on a "no residue" basis, but an application for extension of use has been made. The legal use of this material on animals could possibly be cancelled.

(c) Diazinon, Ciodrin, Delnav, or lindane are also registered for use. Check container label for instructions.

EXTERNAL PARASITES OF DOGS AND CATS

Pest	Insecticide	Mixing and Application	Precautions and Remarks
DOGS			
Fleas Lice Ticks	Sevin 5% Dust Malathion 4% Dust Malathion 57% EC	No mixing necessary. Dust animal thoroughly. (Apply with brush to nervous dogs). 1 oz. of 57% EC per gal. of water	These insecticides may also be used for treatment of kennels, bedding and pens. Do not apply Sevin to puppies under 4 weeks of age.
Ear mites	Malathion 5% aerosol spray can	Apply to the ears.	Repeat every 7 days as needed.
CATS			
Fleas Lice	Sevin 5% Dust Pyrethrin 1% Dust Malathion 4% Dust	Dust thoroughly	Do not apply Sevin to kittens under 4 weeks of age. Cats are sensitive to insecticide. Do not use materials other than those recommended.
Ear mites	(Same as above for dogs)		

Flea collars containing Vapona may be purchased for dogs or cats. Fleas are killed quickly. Ticks are tough and are killed slowly. They will usually be dead in 1-5 days. When bathing dog, remove collar until dog is dry. Replace collar when effectiveness diminishes.

There are aerosol pet sprays for sale that contain pyrethrins for quick knockdown of fleas and ticks, Sevin for residual control and Dichlorophene for aid in control of skin fungi. Co-Ral dog dusters for control of fleas, lice, and ticks are available through veterinarians.

Specially formulated dips for dogs are available for purchase. One of the more popular ones contains Delnav, Vapona and Perthane.

Vapona 23.4% EC can be used as a coarse spray to control fleas and brown dog ticks around dog kennels. Mix with water as a 0.5% spray and spray outside runways, window sills, and ledges.

BIRDS (CANARIES AND PARAKEETS)

Mites Lice	Pyrethrins + Piperonyl butoxide	Cage mite control: remove bird and spray entire cage. Lice control. spray bird directly - hold aerosol 18 inches from bird; spray one burst 2-3 seconds. Apply no more than 3 times per week.

ALFALFA WEEVIL CONTROL

Insecticide	Amt./Acre	Time to Treat	Days to Harvest	Precautions and Remarks
Carbaryl (Sevin) 50% WP	2 lbs.	When 50% or more of tips show weevil feeding before full bud stage.	0	Can be used in ground rig; short to moderate residual.
Malathion (Cythion) 57% EC	1 qt.		0	Very short residual; control for 3-7 days; can be applied by ground rig.
Azinphosmethyl (Guthion) 2 lb./gal. EC	1 qt.		16	Moderate residual; highly toxic; only 1 application per cutting.
Carbofuran (Furadan) 4 lb./gal. F.	2 pt. 1 pt.		28 14	Highly toxic; use only once per cutting. Follow label directions carefully.
Imidan 50% WP	2 lb.		7	Use only once per cutting.
methidathion (Supracide) 2 lbs./gal EC	3 pts.		10	Use only once per cutting. Also labeled for aphids.
Methyl Parathion 4 lb./gal. EC	1 pt.		15	Highly toxic to humans and livestock. Wear protective equipment. May want to have it applied by a custom pesticide applicator.
Diazinon + Methoxychlor (Alfatox)	Check label		7 (grazing) 10 (hay)	Moderate residual. Safe for ground rig.
Methoxychlor EC + Malathion EC (M and M Spray)	2-3 qts.		7 (for the combination)	Will also control aphids and spittlebugs.
Methomyl (Lannate or Nudrin)	0.9 lbs.		7	Highly toxic. Wear protective equipment.
LEAFHOPPERS: Sevin, Methoxychlor, Malathion, Guthion, Cygon				Check labels for dosages
APHIDS: Malathion, Guthion				Check labels for dosages
GRASSHOPPERS: Sevin, Malathion, Diazinon				Check labels for dosages

EC=emulsifiable concentrate; WP=wettable powder; F=flowable; gal.=gallon; pt.=pint; qt.=quart; lb.=pound.

CORN (FIELD)

Pests	Insecticide	Amt./Acre	When to Treat	Days Before Harvest	Remarks
Seed-corn maggot	Lindane (seed treatment)	Check label	Treat seed according to label directions before planting.	—	Advised on early plantings before soil is warm enough to promote quick germination.
	or				
	diazinon (seed treatment)			—	
Cutworms	diazinon 14 G.	14 lbs	For surface cutworms apply just prior to planting or when larvae first appear, and work into soil 1-2 inches. Do not apply after lay-by. For subterranean cutworms, apply just prior to planting; and work into soil 3-6 inches.	—	Cutworms can be expected to be more of a problem on land that was previously in sod and on early planted corn.
	or				
	trichlorfon (Dylox) 80% S.P.	20 ounces	Spray young plants at first sign of injury. Direct spray to lower portion of plant and soil.	28	Treatments are most effective against cutworms when applied in late afternoon.
	or				
	carbaryl (Sevin) 80 S.	2½ lbs	Spray in band on row when damage is noticed.	No time limits	A 5% Sevin Bait at 30-40 lbs per acre has also shown to be effective against cutworms and armyworms.
	or				
	toxaphene 60% E.C.	2⅔ pints	Spray at the first signs of injury.	—	This treatment will also control armyworms. Follow label directions carefully.
Wireworms or White grubs	diazinon 14 G.	21 lbs	Broadcast and disk in before planting. Follow directions on label.	—	Use only on land with a definite history of wireworm infestation, or on land where corn is planted following sod or meadow.
	or				
	dyfonate 10 G.	20 lbs		—	
Corn rootworms	carbofuran (Furadan) 10 G.	10 lbs	Apply any one of the materials listed in a band at planting time according to directions on label.	—	Rootworm treatments are necessary only on land in continuous corn with a definite history of infestation. Furadan will also aid in the control of first generation European corn borer and will reduce losses due to stalk rot.
	diazinon 14 G.	10 lbs		—	
	phorate (Thimet) 10 G.	10 lbs		—	
	bux 10 G.	10 lbs		—	
	dasanit 15 G.	5 lbs		—	
	dyfonate 10 G.	10 lbs		—	
	counter 15 G.	5-6.5 lbs.			

CORN (FIELD) Cont.

Pests	Insecticide	Amount per Acre	When to Treat	Days before Harvest	Remarks
Flea beetles	carbaryl (Sevin) 80 S	2 lbs	Spray young plants when beetles become abundant.	No time limits	Treat only if infestation is heavy.
European corn borer	carbaryl (Sevin) 80 S	2½ lbs	Treat in late whorl stage when 75% of the plants show infestation	--	Direct spray or granules into whorl. Follow label directions.
	or diazinon 14 G	14 lbs		--	
	or EPN 4% G	10 lbs.		14	Control is impossible after worms enter stalk. Early May-planted corn no control needed in June.
Budworms (Corn earworms and Fall armyworm)	carbaryl (Sevin) 80% WP	2 lbs	If 25% of plants are infested	0	When spraying use 10-15 gals. of water per acre to get rundown in whorl. Have nozzles over row. Drive slowly. Granules in whorl are sometimes more effective.
	or Diazinon AG500EC	1 qt.		10	
Grasshoppers	carbaryl (Sevin) 80% WP	1½ lbs		0	Malathion good on small hoppers only.
	or Malathion 57% EC	1 qt.		0	
Southwestern Corn Borer	carbaryl (Sevin) 80% WP	2 lbs.	Apply when 25% of plants show shot hole feeding in whorl.	0	Best control is to plant corn by or before first of May. Control is impossible after worms are inside stalk. Disk stubble in late fall or early spring to destroy worms then.

COTTON INSECT CONTROL

Insecticide Common Name	Other Name	Insects or Other Pests Controlled	Dosage Range Lbs. Actual/A, etc. (Check cotton leaflet)	Precautions
carbaryl	Sevin	boll weevil, bollworm	1.6 lb. + 1 gal. molasses	Many insecticides used on cotton are highly toxic to humans. Extreme caution should be used in handling these materials.
		thrips, plant bugs	1/2 lb.	
endosulfan	Thiodan	bollworm	3/4-1 lb. + 1/4 lb. methyl parathion	
toxaphene	Toxaphene	bollworm, cutworms	1-2 lbs. + 1 lb. methyl parathion	
		plant bugs, thrips	1 lb.	
chlordane	Chlordane	bollworm	1 lb. + 1 lb. methyl parathion	
		boll weevil, thrips, plant bugs	1/4 lb. + 1/4 lb. methyl parathion	
EPN	EPN	bollworm	1/2 lb. + 1/2 lb. methyl parathion	
		thrips, plant bugs	1/8 lb. + 1/8 lb. methyl parathion	
methyl parathion	Methyl Parathion	boll weevil	1/4 lb.	
		bollworm	1 lb.	
		thrips, plant bugs	1/8 lb.	
dimethoate	Cygon, DeFend	plant bugs, thrips	1/10 lb.	
trichlorfon	Dylox	plant bugs	1/4 lb.	
azinphos-methyl	Guthion	boll weevil	1/8 - 1/4 lb.	
		thrips, plant bugs	1/8 lb.	
malathion	Malathion	boll weevil	1 lb.	
monocrotophos	Azodrin	thrips, plant bugs	1/10 lb.	
		whitefly	1/4 lb.	
		boll weevil, bollworm, mites, loopers	6/10 - 1 lb.	
dicrotophos	Bidrin	thrips, plant bugs	1/10 lb.	
chlordimeform	Galecron, Fundal	bollworm, loopers	1/8 - 1/4 lb.	
		mites	1/2 lb.	
methomyl	Lannate, Nudrin	bollworm, loopers	1/4 - 1/2 lb.	
monitor	Monitor	bollworm, loopers	1/2 - 1 lb.	
methidathion	Supracide, Geigy 13005	spider mites	1/2 lb.	
co-mite	Co-Mite	spider mites	1/2 - 1 lb.	
aldicarb	Temik	spider mites, thrips	3/10-1/2 lb. at planting.	
disulfoton	Di-Syston	thrips, plant bugs	1/10 lb.	
phorate	Thimet	thrips, plant bugs	1/10 lb.	

PEANUT INSECT CONTROL

(Methyl Parathion is phytotoxic to peanuts and should not be used)

Insect	Insecticide	Dosage per Acre	Application and Remarks	Precautions
White Grubs and Wireworms	Parathion or	20 lbs. 10% G or ½ gal. EC (4 lbs. per gal.)	Broadcast on soil surface and mix into top 3 to 4 inches of soil immediately following application. Apply 2 weeks before planting.	Parathion is highly toxic to warm-blooded animals. Handle with care and follow all label precautions. (Di-Syston and Thimet are also registered for this use).
	Diazinon	14 lbs. 14% G	Generally a problem when peanuts follow grass sod.	Diazinon-Livestock may be fed (1) peanut forage 7 days after treatment and (2) peanut hay or hulls 21 days after treatment.
Southern Corn Rootworm	Diazinon or	14 lbs. 14% G	Apply in a 12-inch band over the row just before pegging time.	Dasanit and Dyfonate are also registered for this use. Read label directions carefully.
	Parathion	20 lbs. 10% G		
Lesser Cornstalk Borer	Parathion or	20 lbs. 10% G	Apply in an 18-inch band over the row when a damaging infestation is found. Use a 6 to 12 inch granule spreader adjusted approximately one foot above the peanuts.	Dyfonate is also registered for this use. Follow label directions. Diazinon-7 days forage; 21 days hays or hulls. Parathion - 15 days.
	Diazinon	14 lbs. 14% G		
Thrips and Leafhoppers	carbaryl (Sevin) or	20 lbs. 5% D or 1¼ lbs. 80% SP	Apply to foliage as needed to keep damage to a minimum.	Do not feed plants treated with toxaphene or Lannate to poultry, dairy animals or animals being finished for slaughter. Sevin, Di-Syston and Thimet may cause burn on seedling peanuts, but the plants usually recover without apparent permanent damage.
	Toxaphene	10 lbs. 20% D or 1/3 gal. EC (6 lbs. per gal.)		

PEANUT INSECT CONTROL (Cont.)

Insect	Insecticide	Dosage per Acre	Application and Remarks	Precautions
Thrips	Di-Syston or	4 to 6 lbs. 15% G or 3/4 to 1½ pts. (6 lbs. per gal.)	Apply granules in the row with the seed at planting time. If liquid is used, apply 1 to 2 inches to the side of seed. Use lower rate on light, sandy soils.	Under certain conditions where either Di-Syston or Thimet is used, leaf-strapping caused by Falone or Sesone may be greatly increased. The two conditions associated with this damage are rain immediately following cracking time application of the herbicide and cool weather. With favorable weather conditions, affected plants usually recover and produce a normal yield of peanuts (according to Georgia Extension Service). Do not apply within 30 days of harvest.
	Thimet or	6 to 10 lbs. 10% G		
	carbofuran (Furadan)	6-9 lbs. 10% G		
Aphids	Parathion or	1/2 - 3/4 pt. EC (4 lbs. per gal.)	Apply to foliage as needed to prevent damage.	
	Malathion	1 - 1½ pts. EC (5 lbs. per gal.) or 15 - 20 lbs. 5% D		
Red-necked Peanutworm	Toxaphene	10 lbs. 20% D or 1/3 gal. EC (6 lbs. per gal.)	If attack is early enough in growing season to prevent full development of plants, control is probably justified.	Do not apply Lannate within 21 days of combining. Do not feed Lannate treated vines to livestock.
Foliage feeding caterpillars, including corn earworm, fall armyworm, velvetbean caterpillar and webworms	Sevin or	15 lbs. 10% D or 2 lbs. 80% SP	Apply to foliage as needed to prevent excessive damage. If peanuts have a full growth of foliage, it will usually require 4 or more "worms" per foot of row to cause economic loss.	Avoid drift to adjacent crops, especially food or feed crops. If there is danger of drift, Sevin is least likely to cause a residue problem. On crops adjacent to a dairy or feed crop that will be fed to dairy animals, special precautions should be taken to avoid drift.
	Lannate or Nudrin (methomyl)	6-8 oz. 90% SP		
Cutworms	Dylox or	20 lbs. 3-5% B	Apply Dylox bait broadcast.	Avoid breathing Lannate because it is extremely toxic if inhaled.
	Diazinon OR	14 lbs. 14% G	Apply Diazinon granules in a 16-18 inch band over the row.	
	Azodrin	1-1 1/4 pt. of 5 lb. EC	Apply Azodrin in 5 to 15 gals. of water per acre.	

B=bait; D=dust; EC=emulsifiable concentrate; G=granules; SP=sprayable or soluble powder. The formulations listed are the ones most commonly available. Others with equal amounts of active ingredient will usually be just as effective.

SMALL GRAIN INSECT CONTROL*

(Barley, Oats, Wheat and Rye)

Insects	Insecticides	Spray Concentrate per acre	Days from Last Application Harvest	Days from Last Application Grazing	Remarks and Precautions
Army cutworm Armyworms	Methyl parathion (4 lb. EC)	¾-1 pt.	15	15	Parathion not cleared for use on rye. Use with extreme caution.
	Parathion (4 lb.EC)	¾-1 pt.	15	15 see remarks	Toxaphene - do not feed treated forage to dairy animals or animals being finished for slaughter.
	Toxaphene (6 lb.EC)	1½-2 Qt.	0	see remarks	Malathion 57% EC, 1 qt./acre, may be used with a 7 day waiting period.
	Trichlorfon (Dylox) (80% SP)	1.25 lb.	21	3	
Greenbug	Disulfoton (Di-Syston) 6 lb. (wheat only)	½-½ pt.	see remarks		Greenbug control is more effective when temperature is above 50 degrees. Use the higher recommended rates when temperature is below 65 degrees.
	Malathion (5 lb.)	1½-2 pt.	7	7	
	Methyl parathion (4 lb.)	½-1 pt.	15	15	Disulfoton - cleared as foliar spray only on wheat. Wheat can be grazed 7 days after application of 1/3 pint rate or less or 14 days after application of 1/3 to 1/2 pint rate. Do not repeat application within 30 days. Do not harvest grain within 30 days of application.
	Parathion (4 lb.)	½-1 pt.	15	15 see remarks	
	Systox (2 lb.)	1 pt.	45	45	
Grasshoppers	Malathion (5 lb.)	2 pt.	7	7	Toxaphene - see remarks under cutworms and armyworms.
	Toxaphene (6 lb.)	1-1½ qt.	0	see remarks	

*If aphid transmitted barley yellow dwarf disease has been a problem on wheat or oats in past years, 15% Di-Syston granules or 15% Thimet granules may be applied in the seed furrow at planting time. Thimet cannot be used on oats. Follow label instructions for dosages.

SORGHUM INSECT CONTROL

Insecticides for Control of Sorghum Midge

Insecticides	Actual/ Acre	Days Between Last Application and Harvest	When to Apply	Safety Restrictions
Toxaphene	2 lbs.	28	Apply insecticides if 5 or more midge per head are present when sorghum is in bloom. Make second application 4 to 5 days later if midge are still present and sorghum is still blooming.	Do not apply toxaphene more than once after heads begin to form. Do not apply Ethion more than 3 times per season. Do not apply Trithion more than once per season.
Carbaryl (Sevin)	1½ lbs.	21		
Diazinon	½ lb.	7		
Ethion	½ lb.	30		
Cythion	½ lb.	7		
Trithion	1 lb.	21		
dimethoate (Cygon and DeFend)	1/3-2/3 pts.	28		
methomyl (Lannate or Nudrin)	1/4 lb.	See label		

(WARNING: Phytotoxicity frequently results from use of methyl parathion on grain sorghum.)

Insecticides for the Control of Sorghum Webworm, Corn Earworm and Fall Armyworm

Carbaryl (Sevin), methomyl (Lannate or Nudrin)	1½ lb. 1/4 lb.	21 See label	Apply sorghum webworm control measures when 10 or more worms are found to the row foot on 38 to 40 inch rows, or 7 or more on 28-30 inch rows. Control other worms when 8 or more worms found per row foot on 38-40 inch rows, or 6 or more on 28-30 inch rows.
or			
Mevinphos (Phosdrin)	½ lb.	3	

Insecticides for the Control of Sorghum Greenbug (during summer growing season)

Di-Syston	½ lb.	7 (harvest) 28 (forage)		Apply only 2 times per season. Since 1968 biotype C of this pest has been a serious problem on sorghum, even in hot weather, in states west of Arkansas. It has been found in several Arkansas counties.
dicrotophos (Bidrin)	1/4 lb.	See label		
Dimethoate (Cygon and DeFend)	1/3 lb.	28		
Malathion	1 lb.	7		

SOYBEAN INSECT CONTROL

Insecticide		Insects or Other Pests Controlled	Dosage Range (Check soybean Leaflet)	Precautions
Common Name	Other Name			
toxaphene	Toxaphene	cutworms, grape colaspis, white grubs	2 lbs. actual	21 days
carbaryl	Sevin	cutworms, grape colaspis, white grubs	1.6 lbs. actual	No time limitations
		foliage feeders, stink-bugs, pod feeders	1 - 1.5 lbs. actual	
methyl parathion	Methyl Parathion	three-cornered alfalfa hopper	1/4 lb. actual	
		foliage feeders	1/4 to 1/2 lb. actual	
		bollworm	1 lb. actual	20 days
methomyl	Lannate, Nudrin	bollworm, loopers	1/2 lb. actual	Check label

EPN + methyl parathion combinations may be used for foliage feeders and pod feeders at 1/4 to 1/2 lb. actual of each material per acre.

Toxaphene + methyl parathion combination may be used for bollworm control at the rate of 1 or 2 lbs. actual toxaphene + 1 lb. actual methyl per acre.

RICE INSECT CONTROL

Insecticides

Common Name	Other Name	Insects or Other Pests Controlled	Dosage Range (Check rice leaflet)	Precautions
metalkamate	Bux	Rice water weevil	10 lbs. of 20% Granules/ Acre	After Propanil and 1-7 days after flooding.
carbofuran	Furadan	Rice water weevil	15-20 lbs. of 3% Granules/ Acre	After Propanil and 1-21 days after flooding.
malathion	Malathion	Stinkbug, grasshopper, fall armyworm, chinch bug	1 pt. 5 lb. concentrate	7 days of harvest
methyl parathion	Methyl parathion	Same as above	1 pt. 4 lb. concentrate	15 days of harvest
carbaryl	Sevin	Same as above	1½ to 2 lbs. 80% sprayable	14 days of harvest
toxaphene	Toxaphene	Fall armyworm, grasshopper	1/3 gal. 6 lb. concentrate	No limitation on grains.

PASTURE INSECT CONTROL

Pests	When to Treat	Insecticides	Amount Per Acre	Days From Last Appl. to Harvest	Remarks
Fall armyworm, Armyworm	When worm populations and foliage loss indicates control is needed.	Carbaryl (Sevin) (80% WP)	2 lbs.	0	Control is usually needed when there are 3 or more worms per square foot.
		OR			
		Malathion 57% EC	1 qt.	0	
		OR			
		Naled (Dibrom) (8 lb. EC)	1 pt.	0 (grazing) 4 (harvest)	
		OR			
		Trichlofon (Dylox 4 lb. concentrate)	1 pt.	0	Application may be made without removal of grazing livestock.
		Methoxychlor (Marlate) (24% EC)	3 qts.	7	
Grasshoppers	When 7 to 10 are observed per square yard, accompanied by excessive leaf loss.	Carbaryl (Sevin) (80% WP	1¼ lb.	0	Control is best achieved at an economical cost when applications are made in hatching areas before movement into pastures and fields has occurred.
		OR			
		Malathion 57%EC	1 qt.	0	
		OR			
		Diazinon (4 lb. EC)	1-1½ pts.	0 (grazing) 21 (hay)	

HOME ORCHARD SPRAY SCHEDULE FOR TREE FRUITS

Time to Spray	Pests	Material	Trees to Receive the Application
Dormant—when leaves are off and before bud swell in spring	Scale insects Peach leaf curl	Dormant oil (¾ pint) plus Bordeaux mixture (2 oz. bluestone & 3 oz. hydrated lime) in 3 gals. water	All tree fruits**
Pink—just before blossoms open	Apple scab Cedar Apple Rust	2 tb. 75% Zineb or 2 tb. 75% Ferbam in 3 gals. water	Apples only
Petal fall—when three-fourths of petals are off	Scab Codling moth Curculio Plant bugs	General purpose mix*	All tree fruits
First cover spray 14-21 days after petal fall	Scab Blotch Curculio Codling moth	General purpose mix	All tree fruits
Second cover spray 10-14 days after first cover spray	Same	General purpose mix	All tree fruits
Third cover spray 10 days after second cover spray	Apple scab Bitter rot Codling moth	General purpose mix	Apples, pears
Fourth cover spray 21 days after third cover spray	Bitter rot Black rot Codling moth Brown rot Curculio	General purpose mix	All tree fruits
Fifth cover spray three weeks after fourth cover spray	Same as fourth cover spray	General purpose mix	Apples
Sixth cover spray three weeks after fifth cover spray	Same as fourth cover spray	General purpose mix	Apples

*General Purpose Mix - Add the following to 3 gallons water: 9 tablespoons Sevin (50% wettable powder), 6 tablespoons Malathion (25% wettable powder), and 9 tablespoons Captan (50% wettable powder) Ready-to-use general purpose mixes can be purchased.

**All tree fruits includes apples, pears, plums, cherries, nectarines, peaches.

SUGGESTED APPLE SPRAY SCHEDULE (COMMERCIAL) Check leaflet 239 for disease control.

Spray and Time of Application	To Control	Materials and Formulation	Amount to Use Per 100 Gals. of Water	Precautions and Days Between Last Application & Harvest
1. Dormant Spray	San Jose scale	Dormant oil (90% Superior type)	2 gals.	Will help prevent later infestations of scale during the fruiting season.
2. Delayed Dormant Spray When one-half inch of green leaf tissue is showing.	Mites	Dormant oil (90% Superior type)	2 gals.	Timing very critical.
3. Pink or Cluster-Bud Spray When buds separate but before blossoms open	Aphids Mites	Demeton (Systox) (2 lbs./gal. EC) OR Phosphamidon (Dimecron) (8 lbs./gal. EC)	1 pint ¼ pint	Not compatible with Bordeaux or lime sulfur (very hazardous to operator of spray machine). Use these materials if aphids and mites are not under control. Oil can damage trees when applied after buds become too far advanced
4. Bloom Spray When blooms are 20% open	Do not apply insecticides during the bloom period when honeybees are likely to be most active in the orchard.			
5. Calyx Spray (Petal Fall Spray) When ⅞ of petals have fallen	Curculio only	[4] Imidan 50% WP	1 1/2 lbs.	7 days
	Curculio Codling moth	[1]Guthion 50% WP OR [2]Imidan 50% WP OR	⅔ lb. 1 lb.	Guthion is hazardous to operator of spray machine. 7 days. 7 days.
		[3]Zolone 25% WP OR	1-2 lbs.	14 days
		[3]Zolone (3 lb. EC)	1⅓ pts.	14 days.
6. First Cover Spray Should be finished 10-14 days after calyx spray.	If insect problems occur, use same materials listed in Calyx Spray (do not use dieldrin a second time).			
7. Second Cover Spray About 14 days after first cover spray.	Codling moth Curculio	Guthion 50% WP OR Imidan 50% WP OR	⅔ lb. 1 lb.	7 days. 7 days.
		Zolone (See spray No. 5 for EC or WP dosages) OR		
		Sevin 50% WP	2 lbs.	1 day. (Do not use Sevin before Second Cover Spray).
8. Third Cover Spray About 10 days after second cover spray.	Codling moth Mites	Same as No. 7 Omite 30% WP OR	1¼ lbs.	If mites begin to build up, use Omite in 2 successive sprays.
		Plictran 50% WP	4-6 ozs.	14 days. Do not apply more than 4 times per season.

[1] Guthion is very effective against most orchard pests. If used in the Petal Fall and First Cover Sprays on young bearing trees, it may cause a reduction in fruit numbers and yield.

[2] Imidan is effective against wide range of pests. For curculio, best to use at 1½ lb. rate.

[3] Zolone is effective against many pests including mites and aphids. Some russeting of Golden Delicious and other yellow varieties may follow use of Zolone EC in some areas.

SUGGESTED APPLE SPRAY SCHEDULE (COMMERCIAL)
(Continued)

Spray and Time of Application	To Control	Materials and Formulation	Amount to Use Per 100 Gals. of Water	Precautions and Days Between Last Application & Harvest
9. Fourth Cover Spray About 10-14 days after third cover spray. Refer to codling moth discussion.	Codling moth Mites	Same as No. 7 Same as No. 8		
10. Fifth Cover Spray About 3 weeks after fourth cover spray.	Codling moth Mites	Same as No. 7 Same as No. 8		
11. Sixth Cover Spray About 3 weeks after fifth cover spray.	Codling moth Mites	Same as No. 7 Same as No. 8		
12. Seventh Cover Spray About 3 weeks after sixth cover spray.	Codling moth Mites	Same as No. 7 Same as No. 8		
13. Pre-harvest Sprays	Codling moth Aphids Mites	Malathion 25% WP OR Sevin 50% WP	5 lbs. 2 lbs.	If insects other than mites or aphids are a problem, use Sevin. Malathion may be used until 3 days of harvest for mite and aphid control.

SUGGESTED MITICIDES* FOR APPLES

As needed for mite control	Mites	Omite 30% WP OR Tedion 25% WP OR Kelthane 35% WP OR Morestan 25% WP OR Fundal-Galecron (4EC) OR Vendex 50% WP OR Ethion 25% WP	1 to 1½ lbs. 1 lb. 1½ lbs. ¼ lb. 1 pt. 1/4 to 1/2 lb. 1 lb.	7 day limitation. Excellent control, No more than 3 applications after petal-fall. Very effective, but slow acting. 7 days. 35 days. 14 days. 14 days. Do not apply more than 4 times per season. 20-40 days, depending on number of applications in a season.

*Other miticides that are suggested and that are approved by USDA are as follows: Acaralate, Chlorobenzilate, Morocide, Karathane, Demeton (Systox), Dimethoate (Cygon), and Ovex. Follow directions and precautions on the label.

CHERRY INSECT CONTROL (COMMERCIAL)

Spray & Time of Application	To Control	Materials and Formulation	Amt. to Use Per 100 Gals. Water	Precautions & Days Between Last Application & Harvest
1. Dormant Spray After leaves drop and before buds swell	Scale	Dormant Oil (Miscible superior type)*	2 gals.	No time limit
2. Petal Fall Spray When 3/4 of petals have fallen	Plum curculio	Imidan 50% WP	1 lb.	7 days
		OR		
		carbaryl (Sevin) 50% WP	2 lbs.	1 day
		OR		
		Guthion 50% WP	5/8 lb.	15 days
3. Ten days after No. 2**	Plum curculio	Imidan 50% WP	1 lb.	7 days
		OR		
		carbaryl (Sevin) 50% WP	2 lbs.	1 day
		OR		
		Guthion 50% WP	1/2 lb.	15 days
		OR		
		Parathion 15% WP	2 lbs.	14 days
4. Ten days after No. 3**	Plum curculio	carbaryl (Sevin) 50% WP	2 lbs.	1 day
		OR		
		Guthion 50% WP	1/2 lb.	15 days
		OR		
		Parathion 15% WP	2 lbs.	14 days
5. Trunk Spray May 20 to June 10 (apply to lower trunk)	Peach tree borer	endosulfan (Thiodan) 50% WP	3 lbs.	Apply only on bark from scaffold branches to ground
		OR		
		Guthion 50% WP	3 lbs. plus 2 gals. dormant oil	

*95-99% actual oil, 70 sec. oil preferred.

**A spreader or wetting agent may be used to make spray cover waxy fruit. Follow manufacturer's recommendation.

GRAPE INSECT CONTROL

(CHECK INSECTICIDE CONTAINER LABEL FOR
DAYS BETWEEN LAST APPLICATION AND HARVEST)

Name and Timing of Spray	Disease or Insect to Be Controlled	Material and Strength (WP=Wettable Powder)	Amount in 100 Gals.
Dormant spray. After leaf fall but before bud swell. Spray trunk and all wood more than one year old.	Scale	Dormant oil (Superior type)	2 gals.
Bud swell. Examine vineyards for holes or feeding damage to buds.	Climbing cutworms Flea beetles	*Carbaryl (Sevin) 50% WP OR Methoxychlor 50% WP	2 lbs. 3 lbs.
Pre-bloom or as first blooms open. Check for beginning scale crawlers. Spray 7 days after first crawlers appear. About May 15-20 in Washington and Benton counties. Important black rot spray.	Scale crawlers	Parathion 15% WP OR Malathion 25% WP OR *Carbaryl (Sevin) 50% WP OR Diazinon 50% WP	2 lbs. 3 lbs. 2 lbs. 1 lb.
Ten to twelve days after pre-bloom spray. Second scale crawler spray. Check for first brood berry moth larvae in blooms. Important black rot spray.	Scale crawlers Berry moth	Same insecticides as above in pre-bloom spray.	
Two weeks after above spray or when berries are "buckshot" size. Important black rot spray. If insecticide was included in previous spray, it should be omitted here unless insect infestation is observed. Start counting clusters at least once each week, looking for berry moth damaged berries.	Berry moth	Parathion 15% WP OR Malathion 25% WP OR *Carbaryl (Sevin) 50% WP OR **Guthion 50% WP PLUS Spreader-sticker	1½ lbs. 2 lbs. 2 lbs. ⅔ lb.
Special sprays: Check each vineyard every week for berry moth larvae and damaged berries. Increases in numbers of berry moth larvae have been found June 20-25 and about July 20-25 and about Aug. 1-6 in Washington and Benton counties. Spray at 2-week intervals when damaging infestation is found. If rainy weather occurs and diseases have developed, continue fungicide in sprays.	Berry moth Green June beetle	Parathion 15% WP OR Malathion 25% WP OR *Carbaryl (Sevin) 50% WP OR **Guthion 50% WP *Carbaryl (Sevin) 50% WP	1½ lbs. 2 lbs. 2 lbs. ⅔ lb. 2 lbs.

*Not compatible with Bordeaux mixture. It may be necessary to make repeated applications of Sevin for cutworm control.
**There are no time limitations at this rate, but Guthion should not be applied more than 3 times per season. Not compatible with Bordeaux mixture.

PEACH INSECT CONTROL (COMMERCIAL)

(Check insecticide container label for days between last application & harvest)

Spray	Timing	Insects	Materials and Strength	Amt. to Use in Dilute Spray 100 Gals.
Dormant	After leaves drop in the fall and before buds swell in spring. Needed even though effective insecticide was used against scale crawlers in growing season. (Also destroys overwintering mite eggs.)	San Jose scale	Dormant oil 3%	3½ gals. of 90% oil
Petal Fall	When 3/4 petals are off, to protect against tarnished plant bugs and catfacing and give protection against early plum curculio emergence. Use insecticide only as needed.	Plum Curculio* and Catfacing Insects	Parathion 15% WP OR	2 lbs.
			Guthion 50% WP OR	2/3 lb.
			Imidan 50% WP	1½ lbs.
Shuck Spray	When shucks are off. If curculio is not heavy, insecticide may not be needed here.	Plum Curculio and Catfacing Insects	Insecticides same as in petal fall spray.	
Two-Weeks	Two weeks following shuck-off. Include insecticide if stink bugs or curculio are present in orchard. **Do not use dieldrin after two-week spray.	Plum Curculio and Stink Bug	Insecticides same as in petal fall spray.	
Summer Spray	If curculio or oriental moth is a problem.	Plum Curculio and Oriental Fruit Moth	Parathion 15% WP OR	2 lbs.
			Sevin 50% WP OR	2 lbs.
			Guthion 50% WP OR	2/3 lb.
			Imidan 50% WP	1½ lbs.
Additional special sprays for oriental fruit moth: From 6 weeks to 3 weeks before harvest if damaged twigs are numerous.			Use same insecticides as above in Summer Spray.	
Preharvest sprays for oriental fruit moth up to 1 day before harvest.			Sevin 50% WP	2 lbs.
Mite Spray	Special mite sprays may be needed when mites become a problem. Check container labels closely to determine the maximum number of times a miticide may be applied during a fruiting season.	Mites	Omite 30% WP OR	1½ lbs.
			Dicofol (Kelthane) 35% WP OR	1 lb.
			Ovex 50% WP OR	1/2 lb.
			Ethion 25% WP OR	1 lb.
CHECK LEAFLET 227 FOR MORE DETAILS CONCERNING PEACH INSECT CONTROL.			Trithion 25% WP	2 lbs.

Peach Tree Borer: Use 1) Dieldrin (12 lbs. 50% WP), OR Thiodan (3 lbs. 50% WP), OR Guthion (12 lbs. 25% WP plus 2 gals. dormant oil) in 100 gallons of water. Dursban is now registered for peach tree borer control. Use 3.0 lbs. of actual Dursban per 100 gallon of water.

*Since dieldrin manufacture has been cancelled and it is difficult to find in the market place, Imidan is now preferred for curculio control.

PEAR INSECT AND MITE CONTROL (COMMERCIAL)

Spray & Time of Application	To Control	Materials and Formulation	Amt. to Use Per 100 Gals. Water	Precautions & Days Between Last Application & Harvest
1. Dormant Spray Before buds begin to open. Not needed every year.	San Jose scale Mites	Dormant oil (Superior type)	2 gals.	Dormant season only
2. Delayed Dormant Spray 1/2 inch green leaf tissue showing.	No insect control necessary.			
3. Pink or Cluster-Bud Spray When buds separate but before blossoms open.	No insect control necessary.			
4. Bloom Spray When blooms are 20% open.	No insect control necessary.			
5. Calyx Spray As soon as petals have fallen.	Codling moth Plum curculio Plant bugs Stink bugs	Guthion 50% WP OR	1/2 lb.	7 days
		Imidan 50% WP OR	1 lb.	Do not apply within 7 days of harvest.
		Parathion 15% WP	1½ lbs.	14 days. Full coverage spray.
6. First Cover Spray - 10-14 days after Calyx Spray.	Same as No. 5	Same as No. 5		
7. Second Cover Spray 14 days after first cover spray.	Codling moth	Guthion 50% WP OR	1/2 lb.	7 days
		Imidan 50% WP OR	1 lb.	Do not apply within 7 days of harvest.
		Sevin 50% WP OR	2 lbs.	1 day
		*Zolone (3 lb./gal.EC) OR	1½ pts.	14 days (25% WP is available)
		Parathion 15% WP	1½ lbs.	14 days. Full coverage spray.
8. Third Cover Spray - 14 days after second cover spray Additional Sprays as needed.	Codling moth	Same as No. 7		
	Codling moth	Same as No. 7		
	**Mites	Kelthane 18.5% EC OR	1½ pts.	Do not apply within 7 days of harvest.
		Ovex 50% WP OR	½ lb.	Do not apply within 30 days of harvest.
		Tedion 25% WP OR	1 lb.	Not more than 4 applications after petal fall.
		Fundal-Galecron (4 lb. EC) OR	1 pt.	Not more than 3 applications while fruit is on tree.
		Plictran 50% WP OR	4-6 ozs.	14 days
		Vendex 50% WP	4 - 8 ozs.	14 days. Not more than 4 times per season.

*Some russeting of yellow varieties may follow use of Zolone in some areas. Wettable powders & emulsifiable concentrates sometimes do not mix well in tank.

**Follow directions and precautions on miticide-label.

PLUM INSECT CONTROL (COMMERCIAL)

Spray & Time of Application	To Control	Materials and Formulation	Amt. to Use Per 100 Gals. Water	Precautions & Days Between Last Application & Harvest
1. Dormant Spray After leaves drop and before buds swell	Scale	Dormant Oil (Miscible superior type)[1]	2 gals.	No time limit
2. Delayed Dormant When buds begin to show green	Usually insect problems are minimal.			
3. Petal Fall When 3/4 of petals have fallen	Plum curculio	Imidan 50% WP OR	1 lb.	7 days
		Sevin 50% WP OR	2 lbs.	1 day
		Guthion 50% WP	1/2 lb.	15 days
4. Shuck Split[2] When shucks have split	Plum curculio	Imidan 50% WP OR	1 lb.	7 days
		Sevin 50% WP	2 lbs.	1 day
5. Two Weeks Spray[2] Two weeks after Shuck Split Spray	Plum curculio	Imidan 50% WP OR	1	7 days
		Sevin 50% WP	2 lbs.	1 day
6. As needed[2][3] (about 7-10 days after Spray No. 5)	Plum curculio	Guthion 50% WP	1/2 lb.	15 days
7. As needed[2][3] (about 7-10 days after Spray No. 6)	Plum curculio	Guthion 50% WP	1/2 lb.	15 days
(If Spray No. 7 is applied less than 15 days before harvest, Sevin should be substituted for Guthion.)				
8. Summer Spray[2] One month before harvest	Plum curculio	Sevin 50% WP	2 lbs.	1 day
9. Pre-harvest Spray[2] 14 days before harvest	If insect problems occur, use Sevin.			
10. Trunk Spray May 20 to June 20 (apply to lower trunk)	Peach tree borer	endosulfan (Thiodan) 50% WP OR	3 lbs.	Apply only on bark from scaffold branches to ground
		Guthion 50% WP	3 lbs. plus 2 gals. dormant oil	

[1] 95-99% actual oil, 70 sec. oil preferred.
[2] A spreader or wetting agent should be used to make spray cover waxy fruit. Follow manufacturer's recommendations.
[3] Using a jarring sheet in early morning should indicate possible need for additional applications for control of plum curculio between Two Weeks Spray and Summer Spray.

INSECTICIDE SCHEDULE FOR STRAWBERRIES

Insect	Timing	Insecticide	Dosage of Actual Insecticide Per Acre as Dust, Granules or Spray*	Precautions & Days Between Time of Last Application and Harvest.
Strawberry Weevil	When cut buds are noted (usually just after beginning of bloom) and continue at weekly intervals as long as needed.	Sevin OR	1 lb. actual	1 day
		Malathion or	1 lb. actual	3 days
		Guthion	1/2 lb. actual	5 days
Strawberry Rootworm	When adults are numerous.	Toxaphene OR	3 lbs. actual	Not when fruit is present
		Methoxychlor	1½ lbs. actual	3 days
Crown Borer	When adults are active before egg laying begins. Just after beginning of bloom. Two applications at weekly intervals.	Toxaphene OR	3 lbs. actual	Not when fruit is present
		Sevin or	1 lb. actual	1 day
		Guthion	1/2 lb. actual	5 days
Leaf Roller	When damaging infestations occur, usually after harvest.	Diazinon OR	½ lb. actual	5 days
		Guthion	½ lb. actual	5 days
White Grub	When damaged plants are observed and grubs found in soil.	Chlordane	2 lbs. actual**	Not when blooms or fruit are present
Mites	When symptoms occur and mites are numerous.	Kelthane OR	0.8 lb. actual	2 days
		Trithion OR	1.2 lbs. dust OR 0.5 lb. EC or WP	3 days
		Ethion	0.75 lb.	2 days

*When spraying, the required amount of actual insecticide is added to the amount of water required to cover one acre. When dusting, 15-25 lbs. of dust per acre are required for adequate coverage and control. Chlordane and dieldrin may be purchased in granular form.

**The rate per acre of chlordane can be doubled when applied to soil prior to setting of plants.

EC = emulsifiable concentrate
WP = wettable powder

FLOWER INSECT CONTROL

Insect	Insecticides*	How to Mix	Remarks
Ants, sowbugs, soil-nesting wasps	Diazinon 25% EC	3/4 cup	Dosage is for 1000 sq. ft. Apply as a spray or granules and water in thoroughly.
	Diazinon 2% G	5 lb.	
White grubs	Chlordane 45% EC	1/2 cup	Dosage is for 1000 sq. ft. This treatment provides 5 year protection
	Chlordane 10% G	1½ lb.	
Aphids, mealybugs, lacebugs, scales and whiteflies	Malathion 57% EC	2 tsp./gal. water	Spray foliage thoroughly. Repeat treatments may be needed.
	Orthene 75% WP	Ready-to-use packet	1 packet per gal. of water
Blister beetles	Sevin 50% WP	2 Tb./gal. water	Spray foliage. Repeat treatments may be needed.
	Methoxychlor 50% WP	2 tb./gal. water	
Cutworms	Diazinon 25% EC	6 oz./2-3 gal. water	Spray 1000 sq. ft. soil at base of plants. Do not spray on plant foliage. Small numbers of plants can be protected with collars of paper, aluminum foil, or metal.
	Diazinon 2% G	5 lb./1000 sq. ft.	
	Chlordane 45% EC	1/2 cup/1000 sq. ft.	
Grasshoppers	Sevin 50% WP	2 Tb./gal. water	Spray foliage and also adjacent grassy or weedy areas.
	Malathion 57% EC	2 tsp./gal. water	
Iris borer	Cygon, Defend 23.4% EC	4 tsp./gal. water	Apply when irises are in bloom, but not on blooms. Make only one application. Add liquid detergent to improve coverage on leaves.
Leaf miners	Diazinon 2 lb. EC	2 tsp./gal. water	Treat when symptoms appear.
Beetles, caterpillars, plant bugs, leafhoppers, stalk borers, thrips	Sevin 50% WP	2 Tb./gal. water	Spray foliage. Repeat if needed.
	Methoxychlor 50% WP	2 tb./gal. water	Spray foliage. repeat if needed.
	Orthene 75% WP	Ready-to-use packet	1 packet per gal. of water
Mites	Kelthane 18.5% EC	2 tsp./gal. water	Pay close attention to underside of leaves when spraying. Apply 2 or 3 times at weekly intervals.
	Malathion 57% EC	2 tsp./gal. water	
	Orthene 75% WP	Ready-to-use packet	1 packet per gallon of water
Slugs	Metaldehyde Mesurol 2% Bait	Use commercial baits	Remove debris where slugs hide. Apply as baits to soil.

*Do not use oil base sprays on plants. Do not use malathion on African violets. Do not use Sevin on Boston Ivy. Do not use diazinon on ferns. Repeated use of Sevin may cause mite or aphid infestations to increase. Do not use insecticides during full bloom. Do not use Cygon on chrysanthemums.

COMMERCIAL CHRYSANTHEMUM PLANTINGS: Use 1-2 pts. of Nudrin 1.8 S per 100 gals. of water to control cabbage looper, corn earworm, beet armyworm, thrips.

TREE AND SHRUB INSECT CONTROL

Pest	Insecticides	Amt./3 Gals.	Suggestions
Aphids	Malathion 57% EC OR Diazinon, Di-Syston, Cygon, chlorpyrifos or Orthene 75% WP	2 Tb. Check container label for dosages Ready-to-use packet	Spray foliage thoroughly with force. Repeat as needed. Observe all precautions on the label. 1 packet per gal. of water
Bagworm	Carbaryl (Sevin) 50% WP OR Diazinon 25% EC OR Malathion 57% EC OR Bacillus thuringiensis (Dipel) OR chlorpyrifos or Orthene 75% WP	6 Tb. 2 Tb. 3 Tb. Check Labels for Dosages Ready-to-use packet	Treat in late May or early June when worms and bags are small. Older larvae are somewhat resistant to insecticides. 1 packet per gal. of water
Bark Beetles	Lindane 20% EC	3 Tb.	Spray bark of weakened trees not yet infested as protection.
Borers	Lindane 20% EC	4 Tb.	Thoroughly wet the bark of the trunk. Avoid the foliage.
Leaf Defoliators (various caterpillars & beetles, including fall webworm & mimosa webworm)	Carbaryl (Sevin)50% WP OR Methoxychlor 50% WP OR Orthene 75% WP	6 Tb. 6 Tb. Ready-to-use packet	Commercial spray men are necessary for large shade trees. Elms usually require spraying every year. 1 packet per gal. of water
Gall Insects	Sprays after galls form on leaves are ineffective. (Di-Syston granules applied at base of trunk before leaf formation in spring is sometimes beneficial.)		Galls normally do not constitute a hazard to the health of the tree.
Leaf miners (on evergreens)	Diazinon 25% EC OR Dimethoate 2F (Cygon or Defend) Orthene 75% WP	2 Tb. 2 Tb. Ready-to-use packet	Do not use Cygon on Chinese or Burford hollies or azaleas. 1 packet per gal. of water
Leaf miners (on deciduous plants)	Diazinon 25% EC OR Malathion 57% EC Orthene 75% WP	2 Tb. 2 Tb. Ready-to-use packet	Application will need to be repeated for species that have more than one generation per year. 1 packet per gal. of water
Mites	Dicofol (Kelthane) 18.5%EC OR chlorpyrifos or Orthene 75% WP	2 Tb. Check label for Dosage Ready-to-use packet	Pay particular attention to underside of leaves. Apply 2 or 3 times at weekly intervals. 1 packet per gal. of water
Scale Insects	Dormant oil (Miscible) OR Orthene 75% WP Malathion 57% EC	6 Tb. Ready-to-use packet 3 Tb.	Apply before leaves open. Not effective against all scales. 1 packet per gal. of water Do not use malathion on eleagnus. May be necessary to repeat.
Pine Tip Moth	Dimethoate (Cygon) 25% EC	4 Tb.	Timing varies with the season.
Sawflies	Carbaryl (Sevin) 50% WP	6 Tb.	Spray when larvae are small.
Mealybugs, thrips, whiteflies, plant bugs, leafhoppers	Diazinon 25% EC OR chlorpyrifos or Orthene 75% WP	2 Tb. Check label Ready-to-use packet	Spray when necessary. 1 packet per gal. of water

This section was adapted from Control of Household Insect and Mite Pests, Ohio Cooperative Extension Service, Bulletin 512.

This excellent section also includes information on the control of house plant pests, pantry and stored product pests, and wood destroying insects.

HOUSEHOLD PESTS AND CONTROL MEASURES

The following table provides illustrations of most of our common household pests, pesticides, pesticide dosages, and control recommendations. Pests listed in alphabetical order. Both common and trade names are given in this bulletin to help the homeowner recognize various names of pesticides. In no way does this endorse one product over another.

Compounds listed in alphabetical order, not in order of preference.

Pests (Silhouette Shows Approximate Size)	Pesticide	Actual Chemical Percentage: Spray	Actual Chemical Percentage: Dust	Method of Application	Remarks
ANTS (length, 1/6-3/4")	chlordane 4 or 8 lb. EC	2%	5%	**Indoors:** Paint or spray baseboards, cracks, door frames, and window sills. Dust behind baseboards in inaccessible areas. **Outdoors:** Sprinkle dust or spray in nest openings, around foundation, and other places frequented by ants.	**Non-chemical Control:** Eliminate food materials attracting ants into home (not carpenter ants). Follow good sanitary practices. Do not treat entire walls or floors. Use on **limited areas only.** Do not use dust in places where children or pets may become exposed. If necessary, replace timbers damaged by carpenter ants. **Follow label directions.**
	chlorpyrifos (Dursban) 4 lb. EC	0.5%	—		
	diazinon 2 or 4 lb. EC (Spectracide)	0.5%	—		
	heptachlor*	0.5%	—		
	malathion— 5 lb. EC premium grade	3%	4%-5%		
	propoxur (Baygon 1.5 EC	1%	—		
	ronnel (Korlan) 2 lb. EC	1%	—		
	*** Outdoor use only.**				
ASIATIC OAK WEEVIL (length, 3/16")	diazinon 2 or 4 lb. EC (Spectracide)	1%	—	**Outdoors:** Apply spray around foundation, cellar windows, or other points of entry.	**Non-chemical Control** indoors: Sweep, vacuum, or hand-collect individuals and destroy. **Follow label directions.**

Pesticide Dilution Table

Amount of Formulations for 1 gallon water

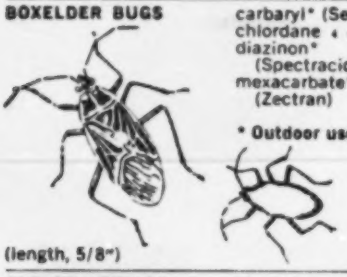
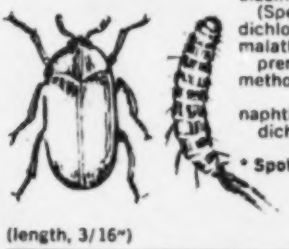
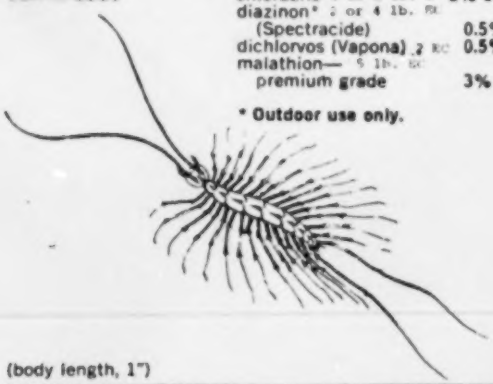
percent of spray mixture wanted

Pesticide Formulations	0.5%	1%	2%	3%	5%
15%-20% EC 1.5 EC	7½ tbsp.	1/2 pt.	1 pt.	1½ pts.	2½ pts.
25% EC 2 EC	5 tbsp.	10 tbsp.	2/3 pt.	1 pt.	1 3/4 pt.
40%-50% EC 4 EC	8 tbsp.	5 tbsp.	10 tbsp.	1/2 pt.	4/5 pt.
70%-75% EC 8 EC	4 tsp.	8 tsp.	5 tbsp.	7½ tbsp.	13 tbsp.

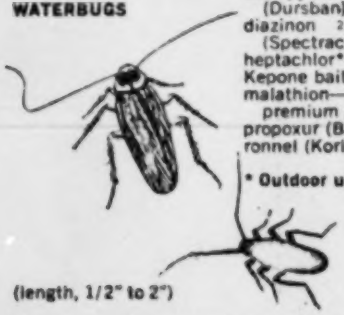
HOUSEHOLD PESTS AND CONTROL MEASURES (Continued)

Pests (Silhouette Shows Approximate Size)	Pesticide	Actual Chemical Percentage: Spray	Actual Chemical Percentage: Dust	Method of Application	Remarks
ASSASSIN BUG (length, 3/4")	chlordane 4 or 8 lb. EC malathion—premium grade 5 lb. EC	2% 3%	— —	**Indoors:** Apply spray directly on pest.	**Non-chemical Control:** Individual bugs can simply be picked up with a vacuum cleaner and then the sweeper bag contents destroyed. Or, the bugs can be collected with a broom and dust pan, crushed, and discarded. Don't handle assassin bugs with bare hands. **Follow label directions.**
BEDBUGS (length, 3/16")	malathion—premium grade 5 lb. EC ronnel (Korlan) 2 lb. EC	3% 1%	— —	**Indoors:** Spray slats, springs, and frames of bed thoroughly. Spray mattress lightly. (Do not overlook mattress tufts and seams.) Paint or spray baseboards, wall cracks, wall pictures, bedside tables, etc.	**Non-chemical Control:** Thorough cleaning will reduce populations, but probably will not eliminate them. Allow all treated surfaces to dry at least 4 hours before use. Replace used bedding with clean, fresh bedding. **Follow label directions.**
BEES (Carpenter) (length, 3/4") Larvae in cells	carbaryl (Sevin 50 or 80 WP dichlorvos (Vapona) 2 EC	1% 0.5%	5%-10% —	**Outdoors:** Sprays or dusts should be directed at the wood galleries. Treat adjacent wooden areas and other potential sites.	Attempt to spray or dust after dark when bees are calm. Treatments are preferred on cool nights. Spray into holes or plug with cotton soaked with pesticide. The holes can later be filled with plastic wood or caulked and then painted. **Follow label directions.**
BEES (Honey)* (in walls of building) (length, 1/2")	carbaryl (Sevin 50 or 80 WP dichlorvos (Vapona) 2 EC	1% 0.5%	5%-10% —	**Outdoors:** Sprays or dusts should be directed into opening where bees have established their nest. To avoid stings, attempt to apply treatment after dark when bees are calm and temperature is lower. It is often necessary to repeat treatment on consecutive nights. Honey should be removed and destroyed.	**Non-chemical control:** Some commercial beekeepers will remove bees from buildings for a fee. Do not expect them to do extensive carpentry work. Place dust only in areas inaccessible to children and pets. * Swarms (masses) of honey bees on shrubs or other structures can be hived by experienced beekeepers. Contact your county Extension office for names of beekeepers who might remove swarms. A small fee is usually made. **Follow label directions.**
BOOKLICE OR BARKLICE (psocids) (length, 1/16")	chlorpyrifos 4 lb. EC (Dursban) propoxur (Baygon) 1.5 lb. EC	0.5% 1%	-- —	**Indoors:** Spray moist places where psocids (booklice) are known to be present. **Outdoors:** Spray or dust moist areas including home foundation, rotting logs, grass piles, etc.	**Non-chemical Control:** Often better than pesticide use. Remove books and papers from damp storage areas. Lower the humidity by airing the room through open doors, use of a fan, or use of a dehumidifier. Raise the room temperature to 60°-70° F. **Follow label directions.**

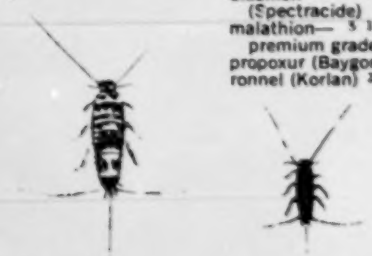
HOUSEHOLD PESTS AND CONTROL MEASURES (Continued)

Pests (Silhouette Shows Approximate Size)	Pesticide	Actual Chemical Percentage: Spray	Actual Chemical Percentage: Dust	Method of Application	Remarks
BOXELDER BUGS  (length, 5/8")	carbaryl* (Sevin) 50 WP chlordane 4 or 8 lb. EC diazinon* (Spectracide) 2 or 4 lb. EC mexacarbate* (Zectran) *** Outdoor use only.**	2% 2% 1% 0.3%	— 5% — —	**Indoors:** Apply chlordane spray directly on pests. **Outdoors:** Spray or dust the clusters of boxelder bugs on trunks of trees, or other areas where they gather.	**Non-chemical Control** (indoors): Collect in vacuum cleaner, or by broom and dust pan and destroy. Plug openings in window sashes to prevent entry. Caulk cracks, etc. Place the dust only in areas inaccessible to children and pets. **Follow label directions.**
CARPET BEETLES  (length, 3/16")	chlordane 4 or 8 lb. EC diazinon 2 or 4 lb. EC (Spectracide) dichlorvos (Vapona) 2 EC malathion*— 5 lb. EC premium grade methoxychlor 50% WP naphthalene or para-dichlorobenzene *** Spot treat only.**	2% 0.5% 0.5% 3% 3%	5%-6% — — — —	**Indoors:** Treat rugs and carpets including baseboards evenly and lightly in areas of infestation. Store only previously cleaned clothing, etc. in air-tight closets or containers. Use 1 lb. of naphthalene or paradichlorobenzene balls, flakes, or crystals per 100 cu. ft. of space in these closets or containers.	**Non-chemical Control:** Follow good housekeeping practices. Clothing should be thoroughly brushed and hung outside in the sunlight. Dry cleaning kills these pests. Prevent lint and dust from accumulating. Clean hot air registers and cold air ducts. Use vacuum cleaner regularly. Frequently remove and destroy disposable vacuum cleaner bag. Never allow clothing, rugs, etc. to lie in a pile neglected over a period of time. **Follow label directions.**
CENTIPEDES  (body length, 1")	chlordane 4 or 8 lb. EC diazinon* 2 or 4 lb. EC (Spectracide) dichlorvos (Vapona) 2 EC malathion— 5 lb. EC premium grade *** Outdoor use only.**	2%-3% 0.5% 0.5% 3%	5%-6% — — —	**Indoors:** Apply malathion, chlordane, or dichlorvos spray directly on pest. Do not overlook the basement and garage. **Outdoors:** Spray or dust all potential pest entry sites and areas where pests are present.	**Non-chemical Control:** Remove excessive mulch, such as decaying grass, leaves, etc. from around the house foundation. If possible, make a foliage-free area around foundation. Place dust only in areas inaccessible to children or pets. Chlorinated hydrocarbons are especially hazardous to cats. **Follow label directions.**
CHIGGERS (length, 1/50")	chlordane 4 or 8 lb. EC diazinon 2 or 4 lb. EC (Spectracide) heptachlor **Repellents for personal protection:** deet ethyl hexanediol	2% 0.5% 1 lb. actual/acre	5% —	**Outdoors only:** Treat areas, especially those not regularly mowed. Also, spray or dust sites where pests are present.	**Non-chemical Control:** Mow areas around house. Spray every 4 to 8 weeks, as needed. Repellents will prevent attack and will relieve itching. **Follow label directions.**
CLOTHES MOTHS (length, 1/2")	chlordane 4 or 8 lb. EC malathion*— 5 lb. EC premium grade methoxychlor 50% WP naphthalene or para-dichlorobenzene *** Spot treat only.**	2% 3% 3%	— — —	**Indoors:** Treat rugs and carpets including baseboards evenly and lightly in areas of infestation. Store only previously cleaned clothing in air-tight closets or containers. Use 1 lb. of naphthalene or paradichlorobenzene balls, flakes, or crystals per 100 cu. ft. of space in these closets or containers. Clothing may be protected by using a ready-to-use pressurized container of insecticide recommended for this purpose. **(Apply as a coarse spray.)**	**Non-chemical Control:** Follow good housekeeping practices. Clothing should be thoroughly brushed and hung outside in the sunlight. Dry cleaning kills these pests. Prevent lint and dust from accumulating. Clean hot air registers and cold air ducts. Use vacuum cleaner regularly. Frequently remove and destroy disposable vacuum cleaner bag. Never allow clothing, rugs, etc. to lie in a pile neglected. **Follow label directions.**

HOUSEHOLD PESTS AND CONTROL MEASURES (Continued)

Pests (Silhouette Shows Approximate Size)	Pesticide	Actual Chemical Percentage: Spray	Actual Chemical Percentage: Dust	Method of Application	Remarks
CLOVER MITES (length, 1/30")	chlorobenzilate* (Acaraben)	0.03%	—	**Indoors:** Direct malathion or pyrethrin spray onto mites in cracks and other areas where they hide. **Outdoors:** Prepare a 24-inch wide strip of bare soil next to the house foundation. Treat with malathion, dicofol, chlorobenzilate, diazinon, propoxur, or mexacarbate, applying to the bare soil as a barrier completely around the house. Spray house siding (usually up to the first floor window sills) and foundation in addition to soil. Treat out from house a distance of 10 feet. Repeat every week as long as needed.	**Non-chemical Control:** A 24-inch band of bare soil around the foundation will discourage mite infestation. Extra precaution should be made to prevent pets and children coming in contact with these pesticides when applied on bare soil as an outdoor-protective barrier. Avoid plant injury. Do not use oil solutions. **Follow label directions.**
	diazinon* 2 or 4 lb. EC (Spectracide)	0.5%	—		
	dicofol* (Kelthane)	0.03%	—		
	malathion— 5 lb. EC premium grade	3%	4%-5%		
	mexacarbate* (Zectran)	0.3%	—		
	propoxur* (Baygon) 1.5 EC	1%	—		
	pyrethrins + piperonyl butoxide	0.1% to 0.25% + 1% to 2%	—		
	* **Outdoor use only.**				
CLUSTER FLIES OR ATTIC FLIES (length, 5/16")	dichlorvos (Vapona) 2 EC	0.5%	—	**Indoors:** Hang dichlorvos resin strips in enclosed spaces such as attics. **Do not use these strips in kitchens, restaurants, or areas where food is prepared, or served.** **Do not use these strips in nurseries, or rooms where infants, ill, or aged persons are confined.** Apply dichlorvos aerosol spray in tight enclosures, then sweep up flies and discard. Pyrethrins may be used indoors for quick knockdown kill. However, the residual effect is short-lasting. **Outdoors:** Spray pyrethrins, propoxur, or dichlorvos around windows before attaching storm windows in autumn months.	Keep insecticides out of the reach of children and pets. **Follow label directions.**
	propoxur* (Baygon) 1.5 EC	1%	—		
	pyrethrins + piperonyl butoxide	0.1% to 0.25% + 1% to 2%	—		
	* **Outdoor use only.**				
COCKROACHES OR WATERBUGS  (length, 1/2" to 2")	chlordane 4 or 8 lb. EC	2%	5%	**Indoors:** Paint or spray chlordane, malathion, diazinon, chlorpyrifos, ronnel, or propoxur on baseboards, cabinets, and other hiding places. Dust or spray behind baseboards, in basements, and in other out-of-sight areas. Treat areas where pipes go through walls or floors. Treat especially cockroach runways under sinks and floor cracks. **Outdoors:** Treat foundation walls and around garbage cans.	Use on limited areas only. Do not treat entire walls or floor. If cupboard shelves are treated, allow to dry, then cover them with clean, fresh shelf-paper before replacing articles. **Do not contaminate food, water, dishes, or utensils.** **Do not allow children or pets near treated surfaces until spray has dried.** **Chlorinated hydrocarbons are especially hazardous to cats.** German cockroaches may be resistant to chlordane, especially if exposed many times previously to this insecticide. **Follow label directions; repeat treatments may be necessary.**
	chlorpyrifos (Dursban) 4 lb. EC	0.5%	—		
	diazinon 2 or 4 lb. EC (Spectracide)	0.5%	—		
	heptachlor*	0.5%	—		
	Kepone bait	(Use as labeled)			
	malathion— 5 lb. EC premium grade	3%	4%		
	propoxur (Baygon) 1.5 EC	1%	—		
	ronnel (Korlan) 2 lb. EC	2%	—		
	* **Outdoor use only.**				
CRICKETS (length, 7/8")	chlordane 4 or 8 lb. EC	2%	5%	**Indoors:** Apply a chlordane, diazinon, malathion, propoxur, chlorpyrifos, or ronnel spray to baseboards, in closets, under stairways, around fireplaces, in basements, and ground level floors, if necessary. **Outdoors:** Apply sprays or dusts to foundation walls, window wells, sub-floor crawl spaces, under garbage cans, at door thresholds, etc.	**Non-chemical Control:** Crickets are most troublesome in dwellings located near grassy areas, dumps, or other refuse areas. Eliminate these attractants. Also, crickets are attracted to lights. **Follow label directions.**
	chlorpyrifos (Dursban) 4 lb. EC	0.5%	—		
	diazinon 2 or 4 lb. EC (Spectracide)	0.5%	—		
	malathion— 5 lb. EC premium grade	3%	4%		
	propoxur (Baygon) 1.5 EC	1%	—		
	ronnel (Korlan) 2 lb. EC	1%	—		
DRAIN FLIES OR MOTH FLIES (length, 1/8")	dichlorvos (Vapona) 2 EC	0.5%	—	**Indoors:** Use aerosol of pyrethrins, or dichlorvos for adult fly control. Clean out drains thoroughly and apply lye solution down the drains. This will kill the immatures. **Outdoors:** Spray with malathion at garbage cans, compost piles, etc.	**Non-chemical Control:** Sanitation is the best control measure. Clean gelatinous film from drains and sinks; clean garbage containers regularly. Do not allow wet lint to accumulate under wash machines. Avoid moist debris of any nature, especially in the basement. **Follow label directions.**
	malathion— 5 lb. EC premium grade	3%	—		
	pyrethrins + piperonyl butoxide	0.1% to 0.25% + 1% to 2%	—		

HOUSEHOLD PESTS AND CONTROL MEASURES (Continued)

Pests (Silhouette Shows Approximate Size)	Pesticide	Actual Chemical Percentage: Spray	Actual Chemical Percentage: Dust	Method of Application	Remarks
ELM LEAF BEETLE (length, 1/4")	malathion— 5 lb. EC premium grade	3%	—	**Outdoors:** Spray at windows, doorways, and other entry sites. Early sprays on adjacent elm trees, if infested, will reduce them.	**Non-chemical Control:** Maintain good, tight window and door screens. If the beetles get indoors, merely pick them up with a vacuum sweeper, or broom and dust pan and dispose of them.
FLEAS (length, 3/32")	carbaryl (Sevin)	—	5%	**On Animal:** Use a rotenone, malathion, carbaryl, or methoxychlor dust formulation on dogs; rotenone, carbaryl, or methoxychlor on cats. **Carbaryl dust should not be used on cats under 4 weeks old.** Veterinarians recommend malathion not be used on cats. **Always consider the health of the animal before using any pesticide.** **Indoors:** Apply malathion or ronnel as a spray to floors, and baseboards, and to walls to a height of 1 foot in rooms where a flea infestation is apparent. If necessary, spray rugs and furniture **lightly,** using a coarse spray. Dust animal's sleeping quarters and replace old bedding with clean, fresh, untreated bedding. **Outdoors:** Treat infested areas of lawn, under dog houses (thoroughly clean the inside of dog houses routinely), under porches, if necessary.	Some cats and some dogs may show a skin sensitivity to the collar. **Do not make the collar too tight on the animal.** **Follow label directions.**
	diazinon* 2 or 4 lb. EC (Spectracide)	0.5%	—		
	dichlorvos (Vapona) 2 EC	9.3%	collar on dogs		
		4.6%	collar on cats		
	malathion— 5 lb. EC premium grade	3%	4%		
	propoxur* (Baygon) 1.5 EC	1%	—		
	ronnel (Korlan)	1%	—		
	rotenone	—	0.1-1.67%		
	*** Outdoor use only.**				
FIREBRATS  (length, 3/8")	chlorpyrifos 4 lb. EC (Dursban)	0.5%	—	**Indoors:** Apply a spray to baseboards, door and window casings, closets and places where pipes go through walls; treat cracks. **Outdoors:** Treat house foundation if an infestation is noticed outdoors.	**Non-chemical Control:** Reducing the humidity will discourage these pests. Keep books and papers in dry storage. Repeat treatment in 2 or 3 weeks, if needed. **Follow label directions.**
	diazinon 2 or 4 lb. EC (Spectracide)	0.5%	—		
	malathion— 5 lb. EC premium grade	5%	—		
	propoxur (Baygon) 1.5 EC	1%	—		
	ronnel (Korlan) 2 lb. EC	1%	—		
FLIES and GNATS (length, 3/16" to 5/16")	chlorpyrifos 4 lb. EC (Dursban)	0.5%	—	**Indoors:** Use an aerosol spray of dichlorvos, or pyrethrins + piperonyl butoxide into the air when flies are present. Dichlorvos resin strips give good control in tight, enclosed areas; however, **dichlorvos resin strips must not be used in kitchens, restaurants, or areas where food is prepared, or served. Do not use these strips in nurseries, or rooms where infants, ill, or aged persons are confined.** **Outdoors:** Apply malathion, ronnel, chlorpyrifos, diazinon, or propoxur to surfaces where flies rest, particularly around outside of doors and windows.	**Non-chemical control:** Good sanitation and tight screens are sound preventive control measures. Use of the ole fly swatter is still practical. Do **not** contaminate food or utensils with insecticides. **Follow label directions.**
	diazinon* 2 or 4 lb. EC (Spectracide)	0.5%	—		
	dichlorvos (Vapona) 2 EC	0.5%	—		
	malathion— 5 lb. EC premium grade	3%	—		
	propoxur* (Baygon) 1.5 EC	1%	—		
	pyrethrins + piperonyl butoxide	0.1% to 0.25% + 1% to 2%	—		
	ronnel (Korlan) 2 lb. EC	1%	—		
	*** Outdoor use only.**				

HOUSEHOLD PESTS AND CONTROL MEASURES (Continued)

Pests (Silhouette Shows Approximate Size)	Pesticide	Actual Chemical Percentage: Spray	Actual Chemical Percentage: Dust	Method of Application	Remarks
FLOUR, GRAIN, OR CHEESE MITE (length, 1/50")	malathion— 5 lb. EC premium grade	3%	—	**Indoors:** First thoroughly clean, then treat infested shelves. Cover shelves with clean, fresh shelf-paper, or foil after spray dries.	**Non-chemical Control:** Discard infested foods and keep "sound" food in tightly fitting lid containers. Do not contaminate food or utensils. **Follow label directions.**
	pyrethrins + piperonyl butoxide	0.1% to 0.25% + 1% to 2%	—		
GROUND BEETLES (length, 1/16" to 1 3/8")	diazinon*2 or 4 lb. EC (Spectracide)	1%	—	**Indoors:** Use a spray of malathion applied on the floor near doorway entrances, baseboards, and other points of entry. **Outdoors:** Use a spray of either malathion, or diazinon. Apply to the house foundation, doorways, window sills, and other points of entry.	**Non-chemical Control:** Usually individual beetles can simply be picked up with a vacuum cleaner and then the sweeper bag contents destroyed, or the beetles can be collected with a broom and dust pan, crushed, and discarded. Usually chemical control measures are not necessary. **Follow label directions.**
	malathion— 5 lb. EC premium grade	3%	—		
	*** Outdoor use only.**				
HACKBERRY PSYLLIDS (length, 1/8")	malathion— 5 lb. EC premium grade	3%	—	**Indoors:** Use pyrethrins plus piperonyl butoxide aerosol to knock-down and kill the adults. **Outdoors:** Spray malathion at windows, doorways, and other entry sites.	**Non-chemical Control:** Maintain good, tight window and door screens. For persistent problems, removal of hackberry trees has been reported effective. Hackberry tree leaves can be sprayed in early May with a dilute spray of either lindane 20%, carbaryl 80% S, or diazinon 4 lbs./gal. EC. **Carbaryl is toxic to honey bees.** **Follow label directions.**
	pyrethrins + piperonyl butoxide	0.1% to 0.25% + 1% to 2%	—		
HORNETS (See Wasps)					
HORNTAIL (pigeon tremex) (length, 1 1/2")	malathion— 5 lb. EC premium grade	3%	—	**Indoors:** Use malathion directly on the pest.	**Non-chemical Control:** Usually individuals can simply be picked up with a vacuum cleaner and then the sweeper bag contents destroyed, or the wasps can be collected with a broom and dust pan, crushed, and discarded. Emergence may occur from hardwood floors, studs, joists, subflooring, etc. They do not reinfest wood in the house. **Follow label directions.**

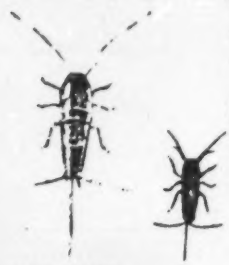
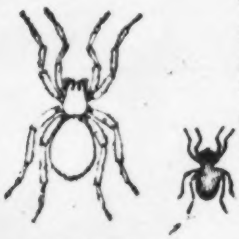
HOUSEHOLD PESTS AND CONTROL MEASURES (Continued)

Pests (Silhouette Shows Approximate Size)	Pesticide	Actual Chemical Percentage: Spray	Dust	Method of Application	Remarks
HOUSE PLANT PESTS (Plant Insects)	chlorpyrifos 4 lb. EC (Dursban)	0.03% to 0.06%	—	**Indoors:** Apply to foliage at first sign of pests. Also, treat surface of soil, pots, saucers, or shelves. Use dicofol for mites.	**Non-chemical Control:** With a light infestation it may be practical to wash-off or pick-off the pests.
APHID	dicofol (Kelthane)	0.031%	—		
	malathion— 5 lb. EC premium grade	0.125%	—	**Caution:** Injury may occur on some plants by malathion. Read label for warnings; treat a small part of foliage before making entire treatment.	Sometimes it is more convenient to dip the infested plants into an insecticide-water mixture.
(length, 3/32")	propoxur (Baygon) 1.5 EC	1%	—		Oil solution carrier may cause burning of plant foliage.
	pyrethrins + piperonyl butoxide	0.1% to 0.25% + 1% to 2%	—		**Follow label directions.**
THRIPS	**MEALYBUG**	**BROWN SOFT SCALE**		**MITE**	**WHITEFLY**
(length, 1/15")	(length, 3/16")	(length, 1/8"-1/2")		(length, 1/50")	(length, 1/25")
(Soil Insects)	malathion— 5 lb. EC premium grade	0.125%	—	**Indoors:** Treat surface of soil.	
COLLEMBOLA (springtail)	**FUNGUS GNAT**			**ROOT APHID**	**PSOCID (booklouse)**
(length, 3/16")	(length, 3/16")			(length, 1/16")	(length, 1/16")
LONG-HORNED BEETLE	malathion— 5 lb. EC premium grade	3%	—	**Indoors:** Use pyrethrins or malathion directly on the pest.	**Non-chemical Control:** Usually individual beetles simply can be picked up with a vacuum cleaner and then the sweeper bag contents destroyed, or the beetles can be collected with a broom and dust pan, crushed, and discarded.
	pyrethrins + piperonyl butoxide	0.1% to 0.25% + 1% to 2%	—		These beetles frequently hitchhike into the home via firewood. It is wise to store firewood outdoors to prevent beetle emergence in the home. They will not infest the house structural wood, or wood in furniture.
(length, 3/4")					**Follow label directions.**
MILLIPEDES	carbaryl* (Sevin) 50 or 80 WP	2%	5%	**Outdoors:** Spray or dust all potential pest entry sites and areas where these pests are present.	**Non-chemical Control:** Millipedes that stray into the home can be picked up with vacuum cleaner attachments and then the sweeper bag contents destroyed, or they can be collected with a broom and dust pan, crushed, and discarded.
	diazinon* 2 or 4 lb. EC (Spectracide)	0.5%	—	Place the dust only in areas inaccessible to children and pets.	**Outdoors:** Remove excessive mulch, such as decaying grass, leaves, etc. from around the house foundation.
(length, 1")	mexacarbate* (Zectran)	0.3%	—		**Follow label directions.**
	propoxur* (Baygon) 1.5 EC	1%	—		
	* Outdoor use only.				

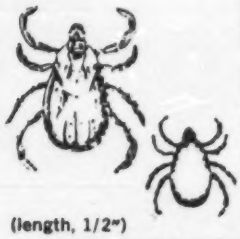
HOUSEHOLD PESTS AND CONTROL MEASURES (Continued)

Pests (Silhouette Shows Approximate Size)	Pesticide	Actual Chemical Percentage: Spray	Actual Chemical Percentage: Dust	Method of Application	Remarks
MOSQUITOES (length, 1/4")	carbaryl* (Sevin)	1%	—	**Indoors:** Use pyrethrins + piperonyl butoxide aerosol; malathion, or dichlorvos spray according to label directions.	**Non-chemical Control:** Maintain good, tight-fitting screens on windows and doors.
	chlorpyrifos 4 lb. EC (Dursban)	0.5%	—	Dichlorvos resin strips: One strip in an area 10' x 10' x 10'.	**Do not use dichlorvos strips in kitchens, restaurants, or areas where food is prepared, or served. Do not use these strips in nurseries, or rooms where infants, ill, or aged persons are confined.**
	diazinon* 2 or 4 lb. EC (Spectracide)	0.5%	—	**Follow label precautions and restrictions explicitly.**	Remove, or frequently empty any containers from premises that may hold rainwater.
	dichlorvos (Vapona) 2 EC	0.5%	—	**Outdoors:** Use either carbaryl, malathion, methoxychlor, chlorpyrifos, or propoxur in yards and picnic areas, on tall grass, and shrubbery. Spray outside entry sites (screens, doors, patios, foundations).	Clean out clogged roof gutters holding stagnant water.
	malathion— 5 lb. EC premium grade	3%	—	**Repellent:** Use deet or ethyl hexanediol aerosol according to directions.	**Follow label directions.**
	methoxychlor	3%	—		
	propoxur* (Baygon) 1.5 EC	1%	—		
	pyrethrins + piperonyl butoxide	0.1% to 0.25% + 1% to 2%	—		
	Repellents for personal protection: deet; ethyl hexanediol				
	* **Outdoor use only.**				
PANTRY AND STORED PRODUCT PESTS	malathion— 5 lb. EC premium grade	3%	—	**Indoors:** Spray shelves lightly. **Do not overspray.** Spray only when shelves are empty and thoroughly cleaned. Force spray into cracks and crevices.	**Non-chemical Control:** Either destroy the infested products, or salvage them by super-heating in an oven at 130° F. for ½ hour, or super-cooling by placing in a deep freeze at 0° F. for 4 days.
ANGOUMOIS GRAIN MOTH (wing span, 1/2")	propoxur (Baygon)** 1.5 lb. EC	1%	—	When spray dries, cover shelves with clean, fresh paper or foil before placing packages of food in the cupboard.	When treating, do not contaminate food or utensils, dishes, etc. with the insecticide.
	pyrethrins + piperonyl butoxide	0.1% to 0.25% + 1% to 2%	—		Store insect-free foods in containers with tight lids.
	** propoxur (Baygon) is registered by EPA for saw-toothed grain beetle only.				**Follow label directions.**
BEAN WEEVIL (length, 1/8")					
CIGARETTE BEETLE (length, 1/10")					
CONFUSED FLOUR BEETLE (length, 1/7")					
DRUG STORE BEETLE (length, 1/10")					
FOREIGN GRAIN BEETLE (length, 1/16")					
GRANARY WEEVIL (length, ⅛")					
INDIAN MEAL MOTH (wing span, 3/4")					
MEALWORM (adult) (length, 1 1/4")					
MEALWORM (larva) (length, 3/4")					
MEDITERRANEAN FLOUR MOTH (wing span, 1")					
RICE WEEVIL (length, 1/8")					
SAW-TOOTHED GRAIN BEETLE (length, 1/10")					
SPIDER BEETLE (length, 1/8")					

HOUSEHOLD PESTS AND CONTROL MEASURES (Continued)

Pests (Silhouette Shows Approximate Size)	Pesticide	Actual Chemical Percentage: Spray	Actual Chemical Percentage: Dust	Method of Application	Remarks
POWDER POST BEETLES (length, 1/8")	chlordane 4 or 8 lb. EC	2%	—	**Indoors and/or Outdoors:** Spray or paint evenly on infested wood. Use at least one gallon of chlordane spray per 100 sq. ft.	**Non-chemical Control:** Painted or otherwise finished wood surfaces generally resist reinfestation.
	pentachlorophenol	5% prepared commercial solution		Spray, paint, or dip with pentachlorophenol prepared solution to saturate the wood, where appropriate.	Shut-off all pilot lights and prohibit smoking to prevent possible explosion. Remove children and pets before and during application. Let treated areas dry before pets and children return.
					Pentachlorophenol is toxic to plants and irritating to the mucous membranes.
					Follow label directions.
SILVERFISH  (length, 3/8")	chlordane 4 or 8 lb. EC	2%	5%	**Indoors:** Apply spray or dust to baseboards, door, and window casings, closets and places where pipes go through walls. Apply dust or spray into cracks.	**Non-chemical Control:** Keep books and paper in dry storage areas to discourage favorable habitat.
	chlorpyrifos (Dursban) 4 lb. EC	0.5%	—		Apply dust in places inaccessible to children and pets.
	diazinon 2 or 4 lb. EC (Spectracide)	0.5%	—		Repeat treatment in 2 or 3 weeks, if needed.
	malathion— 5 lb. EC premium grade	3%	4%		**Follow label directions.**
	propoxur* (Baygon) 1.5 EC	1%	—		
	ronnel (Korlan)	1%	—		
	* **Outdoor use only.**				
SOWBUGS AND PILLBUGS (length, 1/2")	chlorpyrifos (Dursban) 4 lb. EC	0.5%	—	**Indoors:** Use a spray along doorways, basement windows, and other places of entry.	**Non-chemical Control:** Remove leaf piles, grass clippings, old boards, and excess ground cover. Caulk cracks around home foundation.
	diazinon 2 or 4 lb. EC (Spectracide)	0.5%	—		
	propoxur* (Baygon) 1.5 EC	1%	—	**Outdoors:** Use a spray or dust around shrubbery, plants, foundation wall, window wells, and other entry areas.	**Follow label directions.**
	ronnel (Korlan)	1%	—		
	* **Outdoor use only.**				
SPIDERS  (length, 1/5" to 1")	chlordane 4 or 8 lb. EC	2%	5%	**Indoors:** Aerosol sprays of dichlorvos will give good knockdown with some residual control. Chlordane, malathion, diazinon, propoxur, chlorpyrifos, or ronnel should be applied as a coarse droplet spray.	**Non-chemical Control:** Spiders can be successfully kept out of the house by careful screening, secure caulking, etc.
	chlorpyrifos (Dursban) 4 lb. EC	0.5%	—		Practically all spiders in Ohio are harmless and for the most part beneficial to man. The only exceptions are the black widow and brown recluse spiders which are poisonous.
	diazinon 2 or 4 lb. EC (Spectracide)	1%	—		
	dichlorvos (Vapona) 1.5 EC	0.5%	—		
	malathion— 5 lb. EC premium grade	3%	4%	**Outdoors:** Sprays or dusts of these pesticides applied around the house foundation will reduce home infestations.	Dusts should not be applied where children or pets may come in contact with them.
	propoxur (Baygon) 1.5 EC	1%	—		
	ronnel (Korlan)	1%	—		**Follow label directions.**
SPRINGTAILS (Collembola) (length, 3/16")	diazinon 2 or 4 lb. EC (Spectracide)	0.5%	—	**Outdoors:** Treat around the house foundation, especially in grassy, moist areas next to the house.	**Non-chemical Control:** Remove excessive ground cover. Eliminate low moist posts around the house area.
	malathion— 5 lb. EC premium grade	3%	—		**Follow label directions.**

HOUSEHOLD PESTS AND CONTROL MEASURES (Continued)

Pests (Silhouette Shows Approximate Size)	Pesticide	Actual Chemical Percentage: Spray	Actual Chemical Percentage: Dust	Method of Application	Remarks
STONEFLY (length, 1")	malathion— 5 lb. EC premium grade	3%	—	**Indoors:** Use malathion directly on pest. **Outdoors:** Spray along entry areas such as doors, windows, porches, patios, etc.	**Non-chemical Control:** Usually individuals can be simply picked up with a vacuum cleaner and then the sweeper bag contents destroyed, or swept up with a broom and dust pan, crushed, and discarded. Stoneflies accumulate in windows in early spring; seldom far from water. **Follow label directions.**
TICKS  (length, 1/2")	carbaryl (Sevin)	—	5%	**On Animal for Both Species of Ticks (brown and American):** Use carbaryl, malathion, or rotenone. **Indoors:** Use diazinon, dichlorvos, chlorpyrifos, malathion, or propoxur. **Outdoors (area control of ticks):** Use Gardona, diazinon, propoxur, chlorpyrifos, or malathion.	Always consider the health of the animal before using any pesticide. The pet's sleeping quarters should be treated. Be sure to replace old bedding with clean, fresh, untreated bedding. Do not contaminate food or food utensils with insecticide. Chlorinated hydrocarbons are especially toxic to cats. **Follow label directions.**
	chlorpyrifos 4 lb. EC (Dursban)	0.5%	—		
	diazinon 2 or 4 lb. EC (Spectracide)	0.5%	—		
	dichlorvos (Vapona) 1.5 EC	0.5%	—		
	Gardona* 75% SP	0.5%	—		
	malathion—5 lb. EC premium grade	5% pressurized spray	4%		
	propoxur (Baygon) 1.5 EC	1%	—		
	rotenone	—	1.67%		
	Repellents for personal protection: deet ethyl hexanediol (See page 6 for trade names.)				
	*** Outdoor use only.**				
TERMITES (length, 1/4")	aldrin	0.5%	—	**Outdoors:** The soil adjacent to the house foundation must be soaked with the insecticide. Dig a "V"-shaped trench against the foundation wall at least 1 foot deep but no wider than 6". The treatment should be made within 6" of the wall. Treat at the base of this trench; also the fill-in soil. In some cases, concrete floors, patios, walks, etc. should be drilled at 12 inch intervals and the chemical injected under pressure, or by use of special hollow rods inserted into slabs. Be careful not to damage heat pipes, vapor barriers, etc. located under the slab.	**Termite control is usually a job for professional pest control** operators, since homeowners seldom have the training, experience, or equipment. The basic principle of termite control is to break the pest's contact between the wood and soil. Sanitation and structural control measures should be given high priority. **Follow label directions.**
	chlordane 4 or 8 lb. EC	1.0%	—		
	dieldrin	0.5%	—		
	heptachlor	0.5%	—		
	Worker (length ¼")				
WASPS AND HORNETS (length, 1 1/4")	carbaryl (Sevin)	1%	10%	**Outdoors:** Apply directly to nests at night. Wettable powders may be used as dry dusts. Repeat treatment, if necessary. Remove nest when no activity is observed.	For nests below ground, apply insecticide and close ground opening with a shovelful of dirt. Use the wettable powder formulation, or dusts to prevent damage to vegetation. Commercial hornet and wasp aerosol sprays are available. **Follow label directions.**
	chlordane 4 or 8 lb. EC	2%	5%		
	diazinon 2 or 4 lb. EC (Spectracide)	0.5%	—		
	dichlorvos (Vapona) 2 EC	0.5%	—		
	propoxur (Baygon) 1.5 EC	1%	—		
	ronnel (Korlan)	1%	—		
WEEVILS Black vine weevil Rough strawberry root weevil Strawberry root weevil (Migrate into the home; not stored product pests) **STRAWBERRY ROOT WEEVIL** (length, 3/16")	chlordane 4 or 8 lb. EC	2%	5%	**Outdoors:** Apply a dust or spray barrier 2 to 4 ft. wide around house foundation. Be sure to treat cellar windows and other points of entry.	**Non-chemical Control:** These weevils are primarily accidental invaders into the home. They may be picked up with a vacuum cleaner, empty and destroy the contents in the bag; or by using a broom and dust pan. Do not use the dust barrier if children or pets will be exposed. Instead, use spot spray applications at points of entry and confine children and pets until the spray dries. **Follow label directions.**
	diazinon 2 or 4 lb. EC (Spectracide)	1%	—		

TICK, CHIGGER AND INSECT CONTROL IN RECREATION AREAS

Pest	Insecticide	Suggestions
Ants	Chlordane 2% spray OR Diazinon 0.5% spray OR Malathion 3% spray	Area treatments for ticks or chiggers usually control ants. It is best to find ant nests and treat each one individually. Spray or dust in the nest opening, then cover with dirt.
Ticks and Chiggers (use repellent for personal protection)	Heptachlor 10% granules (10 lbs. per acre) OR Diazinon (Spectracide) 1% Spray OR Rabon 0.5% Spray	Do not use heptachlor near water or on poultry or livestock range or pasture. Keeping the grass mowed and scrub-growth down will go a long way toward reducing ticks and chiggers. Treat areas along paths and trails, especially tall grass and shrubs that are not frequently mowed. Repeat every 4-6 weeks if Diazinon or Rabon is used.
Flies	Ronnel (Korlan) diazinon, dimethoate (Cygon and DeFend), pyrethrins, dichlorvos (Vapona), dibrom, malathion, fenthion or Baytex. SEE CONTAINER LABEL FOR DOSAGE TO USE	Apply to surfaces frequented by adult flies. Repeat as needed. Commercial dry baits can be used around garbage cans. Proper garbage disposal will eliminate a large buildup of flies.
Mosquitoes	LARVICIDES	
	Malathion 0.5 lb. actual/acre OR	Avoid hazards to fish and wildlife food or feed crops.
	Abate 1 oz. actual/acre OR	Do not use on cropland areas.
	Kerosene 15-25 gals./acre OR	Exempt from tolerance.
	Flit MLO 2 gals./acre OR	Exempt from tolerance.
	Fuel oil 15-25 gals./acre	Exempt from tolerance.
	ADULTICIDES	
	Sevin 0.5 lb. actual/acre OR	Most effective as dust or granular.
	Malathion 0.5 lb. actual/acre OR	Avoid hazard to fish and wildlife. May cause spotting on some automobiles.
	Baytex 0.05 lb. actual/acre OR	Do not apply closer than 3 week interval.
	Vapona 0.1 lb. actual/acre OR	Use care in handling concentrate.
	Dibrom 0.1 lb. actual/acre OR	Use care in handling concentrate.
	Pyrethrins 0.01-0.08 lb. actual/acre	Use as space spray or fog.

LAWN AND TURF GRASS INSECT CONTROL

Pest	Insecticides	Dosage per 1000 sq. ft.*
Ants	Carbaryl (Sevin) OR	½ lb. 50% WP or 4 lbs. 5% G
	Chlordane OR	½ cup 75% EC or 5 lbs. 5% G
	Diazinon OR	1 cup 25% EC or 5 lbs. 2% G
	chlorpyrifos (Dursban) OR	3 Tb. 22.4% or 5 lbs. 0.5% G
	Ronnel	¾ cup 24% EC
Chinch Bugs	Aspon OR	½ lb. 13% WP or 3 lbs. 5% G
	Carbaryl (Sevin) OR	½ lb. 50% WP or 4 lbs. 5% G
	Diazinon OR	1 cup 25% EC or 7 lbs. 2% G
	chlorpyrifos (Dursban) OR	3 Tb. 22.4% EC or 5 lbs. 0.5% G
	Ethion OR	1 cup 47% EC or 5 lbs. 5% G
	VC-13	2 cups
Ticks	Carbaryl (Sevin) OR	½ lb. 50% WP or 4 lbs. 5% D
	Chlordane OR	2 Tsp. 75% EC
	Diazinon OR	1 cup 25% EC or 5 lbs. 2% G
	chlorpyrifos (Dursban) OR	1 Tb. 22.4% EC
	Toxaphene	2 Tb. 60% EC
Chiggers	Diazinon, Sevin, Chlordane or Toxaphene	Same dosages as for ticks
White Grubs	Chlordane	8 Tb. 75% EC or 5 lb. 5% G
Millipedes and Centipedes	Carbaryl (Sevin) OR	½ lb. 50% WP or 4 lbs. 5% G
	Diazinon OR	2 cups 25% EC or 5 lbs. 2% G
	Dylox	⅔ lb. 50% WP or 2½ lbs. 5% G
Pillbugs or Sowbugs	Diazinon OR	1 cup 25% EC or 5 lbs. 2% G
	chlorpyrifos (Dursban)	3 Tb. 22.4% EC
Crickets	Carbaryl (Sevin) OR	½ lb. 50% WP or 4 lbs. 5% G
	Chlordane OR	4 Tb. 75% EC
	Diazinon OR	1 cup 25% EC
	chlorpyrifos (Dursban) OR	3 Tb. 22.4% EC
	Toxaphene	2 Tb. 60% EC
Clover Mites	Diazinon OR	1 cup 25% EC or 5 lbs. 2% G
	Malathion	2 Tb. 57% EC
Caterpillars (armyworms, webworms, etc.)	Carbaryl (Sevin) OR	½ lb. 50% WP or 4 lbs. 5% G
	Diazinon OR	1 cup 25% EC or 5 lbs. 2% G
	chlorpyrifos (Dusrban) OR	3 Tb. 22.4% EC or 5 lbs. 0.5% G
	Toxaphene	2 Tb. 60% EC
Snails and Slugs	Metaldehyde bait (commercially prepared baits	Use as directed on label
	Mesurol 2% bait	Use as directed on label.

*10-15 gallons of water is usually required for thorough coverage.
EC=emulsifiable concentrate; WP=wettable powder; G=granules; Tb.=tablespoon

PECAN INSECT CONTROL (COMMERCIAL)

Name and Timing of Spray	For Control of	Materials & Formulations	Dosage/100 Gals./Water
Dormant Spray After leaves fall and before buds swell.	Obscure scale	Lubricating or superior oil emulsion	3 gals.
First Pre-pollination Spray When buds are bursting and first leaves are showing up to 1 to 2 inches of new growth. If Phylloxera is not present, omit this spray. To insure good control, make two applications of insecticide 14 days apart.	Phylloxera	Malathion 25% WP OR Guthion 50% WP OR BHC 10% WP OR Lindane 25% WP OR Ethyl parathion 4 lb. EC	3 lbs. ½-1 1/8 lbs. 2 1/2 lbs. 1 1/4 lbs. 3/4 pint
Second Pre-pollination Spray When leaves are half grown. Omit this spray unless Phylloxera has been severe. Look for early feeding in buds and new growth for nut casebearer feeding.	Phylloxera	Same insecticides and dosages as above.	
First Cover Spray About the time tips of young nuts turn brown.	Nut Casebearer	Parathion 15% WP OR Malathion 25% WP OR Guthion 50% WP OR Phosalone(Zolone) 34.8% EC OR Sevin 80% WP	2 lbs. 3 lbs. ½-1 1/8 lbs. 1 1/3 pts. 1½ lbs.
Second Cover Spray Three to four weeks after the First Cover Spray. Check for these and other insect infestations.	Nut Casebearer *Aphids Fall Webworm Walnut Caterpillar Spittle Bug	Parathion 15% WP OR Malathion 25% WP OR Guthion 50% WP	2 lbs. 3 lbs. ½-1 1/8 lbs.
Third Cover Spray Three to four weeks after Second Cover Spray.		Use insecticides only if insect problem is observed.	
Fourth Cover Spray Three to four weeks after Third Cover Spray. Do not spray if aphids are not present.	*Aphids	Parathion 15% WP OR Malathion 25% WP OR Guthion 50% WP OR Endosulfan 50% WP OR Phosalone(Zolone) 34.8% OR Cygon 2.67% EC	2 lbs. 3 lbs. ½-1 1/8 lbs. 2 lbs. 1 1/3 pts. 1 pt.
Additional sprays may be made at any time insects are observed. To time sprays for pecan weevil, jar lower limbs and make 1st application when 6 weevils are jarred from lower limbs. A 2nd application should follow in 10-14 days.	Pecan Weevil	EPN 25% WP OR	2 lbs.
	Black Aphid Caterpillars Mites	Toxaphene 40% WP OR Sevin 80% WP OR Parathion 15% WP OR Malathion 25% WP OR Guthion 50% WP	6 lbs. 1½ lbs. 2 lbs. 3 lbs. ½-1 1/8 lbs.

*Di-Syston may be used in Arkansas for aphid control. Make only one early spring application per season. Do not harvest nuts within 80 days of treatment.

CAUTION: EPN, Parathion and Guthion are extremely dangerous and should be applied only by a trained operator. Parathion, Guthion, Endosulfan and EPN should not be applied after shuck split.

STORED GRAIN INSECT CONTROL

Insects	Insecticides to Use (Remarks and Precautions)

Rice weevil, Granary weevil, Lesser grain borer, Angoumois grain moth, Flat grain beetle, Confused flour beetle, Red flour beetle, Cadelle, Saw-toothed grain beetle

Fumigation

The storage bin should be tight for best results. Always use a gas mask and never fumigate a bin by yourself. The fumigant mixtures suggested for use can be bought commercially prepared. Fumigate on a still day when the temperature is above 70° F. Keep the bin closed for at least 3 days and do not enter the bin for 72 hours. Fumigation is not a permanent control. Repeat fumigations may be necessary. Fumigants do not prevent seed germination.

Gallons of Fumigant to Apply per 1,000 Bushels of Stored Grain[4/]

Fumigant Mixtures (in gallons)	Metal Bin			Wood Bin		
	Wheat Rye	Shelled Corn, Oats, Barley	Grain Sorghum	Wheat Rye	Shelled Corn, Oats, Barley	Grain Sorghum
80% carbon tetrachloride 20% carbon bisulfide[1/]	3	3.5	5	6	7	10
75% ethylene dichloride[2/] 25% carbon tetrachloride	3.5	5	DO NOT USE	7	10	DO NOT USE
5% ethylene dibromide[2/3/] 35% ethylene dichloride 60% carbon tetrachloride	3	3.5	5	6	7	10

1/ Carbon bisulfide is explosive when used without a fire suppressant such as carbon tetrachloride. Apply when grain temperature is above 60° F.

2/ Apply when grain temperature is above 70° F.

3/ Grain treated with fumigants containing ethylene dibromide should be thoroughly aerated before feeding to laying hens. Phostoxin can also be used as a fumigant at the rate of 300 pellets per 1,000 bushels of grain. The bin must be closed a minimum of 4 days with this material. Read the label for additional information.

4/ For lots of 500 to 1000 bushels, use the same dosage as recommended for 1000 bushels; with smaller lots thoroughly wet the entire surface with fumigant.

STORED GRAIN INSECT CONTROL (Cont.)

Insects	Insecticides to Use (Remarks and Precautions)
Rice weevil, Granary weevil, Lesser grain borer, Angoumois grain moth, Flat grain beetle, Confused flour beetle, Red flour beetle, Cadelle, Saw-toothed grain beetle	**Clean Bins** Clean grain bins thoroughly at least two weeks before putting grain in them. Never put newly harvested grain in bins with old grain. Feed old grain to livestock. Outside, remove accumulations of spilled grain from under and around bins. **Spraying Recommendations for Empty Bins** Use one of the following mixtures to make enough spray to treat 1000 square feet: 1 lb. of 50% methoxychlor WP in 2½ gallons water 1 qt. of 25% methoxychlor EC in 2½ gallons water 1/2 pint of 57% malathion EC premium grade (Cythion) in 2 gallons water 1 1/3 pints of 6% pyrethrins combined with 60% piperonyl butoxide in 2 gals. water **Sprays for Treating Grain Going into Storage** Apply directly to grain as it is put in storage. Mix one of the following in 2 to 5 gallons of water and apply to 1000 bushels of grain: 1 pint of malathion premium grade (Cythion) 57% EC 1 qt. of pyrethrins 6% plus piperonyl butoxide 60% **How to Protect Small Amounts of Seed from Insects** 1. Protection of seed that is to be eaten: a. Heat (do not use heat treatment if seed will be used for planting) Place in an oven, heat until center of the mass is 120° F.; hold this temperature for 30 minutes. Temperature can be checked with a meat thermometer. Place in a tight container and keep closed. b. Cold Place container in deep freeze. Hold at 0° F. for at least 4 days. 2. Protection of seed that will not be eaten: a. Mix seed with 1/4 ounce of 5% malathion dust per gallon of seed.

Vegetable Insect Control Recommendations for Home Gardeners

CROP	INSECT	WHEN to TREAT	TREATMENT (EC=Emulsifiable Concentrate, WP=Wettable Powder)	AMOUNT OF EC OR WP TO MIX WITH 1 GAL. OF WATER*	PRECAUTIONS** AND DAYS BETWEEN LAST APPLICATION AND HARVEST
Asparagus	Asparagus beetle	When damage appears.	Malathion 5% dust	***	1
			Malathion 57% EC	1 Tbs.	1
			Sevin 5% dust	***	1
			Sevin 50% WP	3 Tbs.	1
Beans (snap or lima)	Seed corn maggot	Seed should be treated before planting by adding a "pinch" per pound and rotating seed in a container until seed are coated.	Spectracide 50% WP (Diazinon)		Seed treatment only
	Bean leaf beetle, Mexican bean beetle	When damage occurs.	Malathion 5% dust	***	1
			Malathion 57% EC	1 Tbs.	1
			Sevin 5% dust	***	0
			Sevin 50% WP	3 Tbs.	0
			Methoxychlor 50% WP	2 Tbs.	3
	Corn earworm	When first pods are 1 inch long and weekly thereafter.	Sevin 10% dust	***	0
			Sevin 50% WP	2 Tbs.	0
	Mites	When mites are present in damaging numbers.	Kelthane 18.5% EC	1 Tbs.	7
			Kelthane 18.5% WP	2 Tbs.	7
			Ethion 25% WP	2 Tbs.	2
	Stink bugs	When damage appears.	Sevin 5% dust	***	0
			Sevin 50% WP	2 Tbs.	0
Beets	Flea beetles, webworm	When insects appear in damaging numbers.	Sevin 5% dust	***	3
			Sevin 50% WP	3 Tbs.	3
Carrots	Flea beetles, celery worm, leafhopper	When insects appear in damaging numbers.	Sevin 5% dust	***	0
			Sevin 50% WP	2 Tbs.	0
Cole Crops broccoli, Brussel sprouts, cabbage, cauliflower)	Cutworms	When damage first appears.	Keep seed bed free of vegetation for 3 weeks before planting		
			Toxaphene 20% dust	***	No residue problem should appear when used on seedling plants for cutworm control.
			Toxaphene 60% EC	1 Tbs.	
			Dylox 5% bait	***	
			Diazinon 14% granules (use as instructed on the label)	***	
	Caterpillars (loopers),**** Harlequin bug aphids,	When insects appear. Make applications weekly until control is adequate.	Malathion 5% dust	***	7
			Malathion 57% EC	1 Tbs.	7
			Cygon 26% EC	1 Tbs.	7
			Dibrom 60% EC	2 Tsp.	1

VEGETABLE INSECT CONTROL RECOMMENDATIONS FOR HOME GARDENERS (Cont.)

CROP	INSECT	WHEN to TREAT	TREATMENT (EC = Emulsifiable Concentrate; WP = Wettable Powder)	AMOUNT OF EC OR WP TO MIX WITH 1 GAL. OF WATER*	PRECAUTIONS** AND DAYS BETWEEN LAST APPLICATION AND HARVEST
Cucurbits	Cucumber beetles, darkling beetle	When seedlings begin to emerge from soil	Sevin 5% dust[1]	***	0
			Sevin 50% WP[1]	2 Tbs.	0
			Malathion 5% dust	***	1
	Pickleworm, squash bug	When damage appears	Sevin 5% dust[1]	***	0
			Sevin 50% WP[1]	2 Tbs.	0
			Malathion 5% dust	***	1
			[1]Follow dosage recommendations carefully and do not treat when vines are wet.		
	Aphids	When insects appear in damaging numbers.	Malathion 5% dust	***	1
			Malathion 57% EC	1 Tbs.	1
			Thiodan 50% WP	1 Tbs.	0
	Mites	When damage appears.	Kelthane 3% dust	***	2
			Kelthane 18.5% EC	1 Tbs.	2
			Ethion 25% WP	2 Tbs.	0
Eggplant	Cutworms	When worms appear.	Keep seed bed free of vegetation for 3 weeks before planting.		No residue problem should occur when used on seedling plants for cutworm control.
			Toxaphene 10% dust	***	
			Toxaphene 60% EC	1 Tbs.	
	Flea beetle, Colorado potato beetle, webworm, hornworm, earworm, Tortoise beetle	When damage becomes apparent.	Sevin 10% dust	***	0
			Sevin 50% WP	2 Tbs.	0
	Aphids, lacebug, blister beetle	When insects appear in damaging numbers.	Malathion 5% dust	***	3
			Malathion 57% EC	1 Tbs.	3
	Mites	When damage appears.	Ethion 25% WP	2 Tbs.	0
			Kelthane 3% dust	***	2
			Kelthane 18.5% EC	1 Tbs.	2
Potatoes (Irish or white)	Colorado potato beetle, potato leafhopper, flea beetles	When insects or insect damage appears.	Sevin 5% dust	***	0
			Sevin 50% WP	2 Tbs.	0
			Thiodan 50% WP	2 Tbs.	0
	Aphids, blister beetles	When insects appear in damaging numbers.	Malathion 5% dust	***	0
			Malathion 57% EC	1 Tbs.	0
	Wireworms, grubs	Prior to planting in fields infested with these insects. Broadcast on soil and work in upper six inches.	Chlordane 5% dust	***	No residue problems should arise from the recommended use of chlordane or diazinon as a soil treatment.
			Chlordane 72% EC	1 Tbs.	
			Chlordane 40% WP	1½ Tbs.	
			Spectracide 50% WP (diazinon)	6 Tbs.	
Radishes	Flea beetles, caterpillars	When insects appear in damaging numbers.	Sevin 5% dust	***	3
			Sevin 50% WP	2 Tbs.	3
	Aphids	When aphids appear in damaging numbers.	Malathion 5% dust	***	7
			Malathion 57% EC	1 Tbs.	7
			Spectracide 50% WP (diazinon)	1 Tbs.	10

VEGETABLE INSECT CONTROL RECOMMENDATIONS FOR HOME GARDENERS (Cont.)

CROP	INSECT	WHEN to TREAT	TREATMENT (EC=Emulsifiable Concentrate, WP=Wettable Powder)	AMOUNT OF EC OR WP TO MIX WITH 1 GAL. OF WATER*	PRECAUTIONS** AND DAYS BETWEEN LAST APPLICATION AND HARVEST
Spinach	Aphids, plant bugs, caterpillars, leafhoppers	When insects appear or as needed to keep crop free of insects	Malathion 5% dust Malathion 57% EC Cygon 26% EC	*** 1 Tbs. 1 Tbs.	7 7 14
Sweet corn	Flea beetles	When damage appears.	Sevin 5% dust Sevin 50% WP Sevin 80% WP	*** 3 Tbs. 2 Tbs.	0 0 0
	Earworm	Apply to silks every other day beginning at 10% silking and continuing until 90% of silks have wilted.	Sevin 10% dust Sevin 50% WP	*** 6 Tbs.	0 0
	Budworms (fall armyworms and earworms in whorls of plant)	When damage appears.	Sevin 10% dust Sevin 50% WP	*** 3 Tbs.	0 0
	European corn borer, southwestern corn borer	When 50% of plants show rows of tiny pinholes in leaves.	Sevin 5% dust Sevin 50% WP	*** 3 Tbs.	0 0
Greens	Aphids, Harlequin bugs, leafhoppers, caterpillars, false chinch bugs (loopers)****	When insects appear or as needed to keep crops free of insects	Malathion 5% dust Malathion 57% EC Cygon 26% EC Dibrom 8 EC	*** 1 Tbs. 1 Tbs. 1 Tsp.	7 7 14 4
Lettuce	Aphids, leafhoppers, plant bugs, caterpillars	When insects appear.	Malathion 5% dust Malathion 57% EC	*** 1 Tbs.	14 14
Okra	Aphids	When insects appear.	Malathion 5% dust Malathion 57% EC	*** 1 Tbs.	1 1
	Earworms, stink bugs, leaf-footed bugs	When insects appear.	Sevin 10% dust Sevin 50% WP	*** 4 Tbs.	0 0
Onions	Thrips	When damage appears.	Malathion 5% dust Malathion 57% EC	*** 1 Tbs.	3 3
Peas (garden or English)	Aphids	When insects appear.	Malathion 5% dust Malathion 57% EC Spectracide 50% WP (diazinon)	*** 1 Tbs. 1 Tbs.	3 3 0
Peas (Southern)	Aphids	When insects appear.	Malathion 5% dust Malathion 57% EC	*** 1 Tbs.	3 3
	Cowpea curculio	One application at bloom and two additional applications at weekly intervals.	Toxaphene 20% dust Toxaphene 60% EC	*** 1 Tbs.	Do not use after pods begin to form if peas are to be used as green snaps.
	Earworm	When worms appear.	Sevin 10% dust Sevin 50% WP	*** 4 Tbs.	0 0

CROP	INSECT	WHEN to TREAT	TREATMENT EC=Emulsifiable Concentrate WP=Wettable Powder	AMOUNT OF EC OR WP TO MIX WITH 1 GAL. OF WATER*	PRECAUTIONS** AND DAYS BETWEEN LAST APPLICATION AND HARVEST
Peppers	Cutworms	When damage appears.	Toxaphene 20% dust	***	No residue problem should occur when used on seedling plants.
			Toxaphene 60% EC	1 Tbs.	
	Flea beetles, Colorado potato beetle, earworm, European corn borer, hornworms	When insects appear in damaging numbers. Hand picking of hornworms may be sufficient.	Sevin 10% dust	***	0
			Sevin 50% WP	4 Tbs.	0
	Aphids	When aphids appear in damaging numbers.	Dimethoate 2.67EC	1 tsp.	0
			Malathion 5% dust	***	3
			Malathion 57% EC	1 Tbs.	3
			Thiodan 50% WP	2 Tbs.	4
Sweet potatoes	Cutworms	When damage first appears.	Toxaphene 20% dust	***	No residue should occur when toxaphene or diazinon is used on newly set plants for cutworm control.
			Toxaphene 60% EC	1 Tbs.	
			Diazinon granules		
	Flea beetle, fruitworm, beetle caterpillars	When damage occurs.	Sevin 5% dust	***	0
			Sevin 50% WP	2 Tbs.	0
			Malathion 5% dust	***	3
	Wireworms and other soil born insects	Work chlordane into soil at planting time. Apply diazinon granules over the row when roots begin to enlarge.	Chlordane granules OR Diazinon granules	Check label for dosages	No residue problems should arise from use of these insecticides when used as a soil treatment as recommended.
Tomatoes	Flea beetle, fruitworm, hornworms, stink bugs	Every 5 to 10 days beginning at bloom for fruitworm. When other insects appear.	Sevin 10% dust	***	0
			Sevin 50% WP	5 Tbs.	0
	Aphids, blister beetles		Malathion 5% dust	***	1
			Malathion 57% EC	1 Tbs.	1
			Thiodan 50% WP	1 Tbs.	1
	Mites	When damage appears.	Kelthane 3% dust	***	2
			Kelthane 18.5% EC	1 Tbs.	2
	Cutworms	When damage appears.	Toxaphene 20% dust	***	No residue should occur when toxaphene is used on newly set plants for cutworm control.
			Toxaphene 60% EC	1 Tbs.	

*Wettable powders are omitted in some cases to conserve space. They are generally as effective at comparable rates, but usually require more agitation.

**Wash quickly and thoroughly if emulsifiable concentrates are spilled on skin or come in contact with the body. Wash exposed areas of skin after using any insecticide. All vegetables that have been treated with an insecticide should be washed before they are eaten.

***Dusts should always be applied as a fog to cover leaf surfaces with a very light but visible film of insecticide. A hand operated crank duster is in most cases the only hand equipment that is really acceptable for applying dusts. However, a puff duster is adequate for small plants such as young cucumbers and for treating silking ears of corn.

****Cabbage loopers are likely to be resistant to nearly all insecticides safe enough for use in home gardens. Thiodan or Dibrom may give fair looper control. Read label carefully for rates and precautions. Dipel, an improved formulation of Bacillus thuringiensis is registered for use in home gardens. Arkansas research data has indicated good looper control on worms that are less than full grown. Dipel is very safe to use, but somewhat slow acting.

Vegetable Insect Control Recommendations for Commercial Growers

Crop	Insect	When to Treat	Treatment*	Pounds Actual Insecticide Per Acre As Dust or Spray** (unless otherwise indicated)	Precautions and Days Between Last Application & Harvest
Asparagus	Asparagus beetle	When damage appears	Malathion D-EC Carbaryl (Sevin) D-EC	1.0 1.25	1 day 1 day
Beans (Snap or lima)	Seed corn maggot	Treat seed before planting	Diazinon 50% WP OR Commercial Seed Protectant (Delsan or Ortho Seed Guard) OR Ethion WP (Nialate) OR Phorate (Thimet) granules	3/5 oz./bu. Use according to label directions 1.0 oz./100 lbs. seed 1.5	Treat seed no longer than 3 months before planting Seed treatment only Seed treatment only Soilband. Both sides of rows at planting but not in contact with seed. Do not feed forage within 60 days
	Bean leaf beetle Mexican bean beetle	When damage occurs	Carbaryl (Sevin) WP-D OR Malathion D-EC OR Endosulfan (Thiodan) WP OR Diazinon EC-WP	1.5 1.25 1.0 0.5	No limitation 1 day 3 days. Don't apply more than 3 times per season 7 days
	Corn earworm	When first pods are 1 inch long and weekly thereafter	Carbaryl (Sevin) D-WP or Methomyl (Lannate Nudrin)	1.5 0.5	No limitation 1 day
	Mites	When mites are present in damaging numbers	Dicofol (Kelthane) EC OR Carbophenothion (Trithion) EC OR Demeton (Systox) EC OR Ethion EC OR Dimethoate (Cygon 2.67 and DeFend 2.67)	0.5 0.75 0.25 0.5 1.0 pt.	7 days. Don't feed vines to livestock 7 days. Don't feed vines to livestock 21 days 2 days. Don't feed treated foliage to livestock 0 days
	Stinkbugs	When damage appears	Carbaryl (Sevin) D-WP OR Endosulfan (Thiodan) WP-EC	1.5 1.0	No limitations 3 days. Don't use on lima beans. Don't use more than 3 times per season
Beets	Flea beetles, webworm	When insects appear in damaging numbers	Carbaryl (Sevin) D-WP OR Malathion EC	1.5 1.25	3 days 7 days if tops are to be used as feed.

VEGETABLE INSECT CONTROL RECOMMENDATIONS FOR COMMERCIAL GROWERS (Cont.)

Crop	Insect	When to Treat	Treatment*	Pounds Actual Insecticide Per Acre As Dust or Spray** (unless otherwise indicated)	Precautions and Days Between Last Application & Harvest
Carrots	Flea beetles, celery worm, leafhopper	When insects appear in damaging numbers	Carbaryl (Sevin) D-WP OR Malathion D-EC	1.5 1.0	No limitations 7 days
Cole Crops (Broccoli, Brussel sprouts, cabbage, cauliflower)	Cutworms	When damage first appears	Toxaphene D-EC OR Trichlorfon (Dylox) B-EC	2.0 1.0	Apply to soil, not plants. Do not apply dusts within 14 days of harvest or sprays after edible parts begin to form Spray lower part of plant and soil around base. Do not apply within 21 days of harvest
	Cabbage looper	See section on loopers at end	Methomyl (Lannate) D-EC OR Nudrin EC (control other worms also) OR Bacillus thuringiensis (Dipel, Biotrol, Thuricide) OR Galecron EC-SP OR Fundal EC-SP (controls other worms also) OR Monitor EC	0.45-0.9 See rates on label See rates on label 0.5 0.5 0.5-1.0	7 days: broccoli and cauliflower; 14 days; Brussel sprouts; 1 day; cabbage. Use at 5 to 7 day intervals during the growing season when worms first appear No restrictions. Apply when loopers are small 14 days. Do not make more than 9 applications. Fundal and Galecron control only the egg stage plus newly hatched worms 7-14 days, check label Good aphid control.
	Other caterpillars and Harlequin bug	When insects appear. Make applications weekly until control is adequate	Malathion D-EC OR Mevinphos (Phosdrin) EC OR Endosulfan (Thiodan) D-EC OR Parathion D-WP-EC OR Naled (Dibrom) EC	1.0 0.5 1.0 0.5 2.0	7 days; broccoli—3 days 1-3 days. Works best during warm weather 7-14 days, check label 7-10 days 1 day
	Aphids	When insects appear	Phosdrin, Malathion, Guthion, Cygon, Parathion, Systox, Thiodan, Dibrom, Diazinon, Di-Syston or Monitor	See rates on label	Check label
Cucurbits (Cantaloupe, cucumber, pumpkin, squash, & watermelon)	Cucumber beetle, darkling beetle	When seedlings begin to emerge from the soil. Control is essential. Cucumber beetles carry wilt diseases of these crops	Carbaryl (Sevin) D-WP OR Endosulfan (Thiodan) D-EC OR Methoxychlor D-EC	1.0 0.5-1.0 1.0	No restrictions. Highly toxic to honeybees No restrictions. Moderately toxic to honeybees 1 day; don't use on watermelon

VEGETABLE INSECT CONTROL RECOMMENDATIONS FOR COMMERCIAL GROWERS (Cont.)

Crop	Insect	When to Treat	Treatment*	Pounds Actual Insecticide Per Acre As Dust or Spray** (unless otherwise indicated)	Precautions and Days Between Last Application & Harvest
Cucurbits (Cont.)	Pickleworm, squash bug	When damage appears	Carbaryl (Sevin) D-WP OR Endosulfan (Thiodan) D-EC	1.0 1.0	No limitations No limitations
	Aphids	When insects appear in damaging numbers	Malathion D-EC OR Endosulfan (Thiodan) D-EC OR Diazinon D-EC OR Carbophenothion (Trithion) EC OR Mevinphos (Phosdrin) EC	1.25 0.5 0.5 0.75 0.5	1 day No limitations 3-7 days, check label for crop 5-7 days, check label for crop 1 day, do not use on pumpkin
	Mites	When damage appears	Dicofol (Kelthane) D-EC OR Ethion EC	0.4 0.5	2 days. Sprays are more effective than dusts No limitations. Do not use ethion on winter squash
Eggplant	Cutworms	When worms appear	Toxaphene D-EC OR 3% Toxaphene Bait	2.0 20-40 lbs.	Broadcast and work into soil before planting Apply in late afternoon. Apply to soil, not plants
	Flea beetle, potato beetle, webworm, hornworm, earworm, Tortoise beetle	When damage becomes apparent	Carbaryl (Sevin) D-WP OR Endosulfan (Thiodan) WP-EC	2.0 0.5	No limitations 1 day
	Aphids, lacebug, blister beetle	When insects appear in damaging numbers	Malathion D-EC-WP or Endosulfan (Thiodan) D-EC	1.5 0.5	3 days 1 day
	Mites	When damage appears	Dicofol (Kelthane) D-EC	0.5	2 days
Greens (Collards, kale, mustard, turnip)	Aphids, Harlequin bug, leafhopper, caterpillars, false chinch bug	When insects appear or as needed to keep crops free of insects	Parathion D-EC-WP OR Mevinphos (Phosdrin) D-EC-WP OR Naled (Dibrom) D-EC	0.5 0.5 1.0-2.0	10 days. Parathion is not effective at low temperatures 3 days On foliage every 7 days
	Cabbage looper	See section on loopers below	B. thuringiensis (several trade names)	Check label	No restrictions

Crop	Insect	When to Treat	Treatment	Pounds Actual Insecticide Per Acre As Dust or Spray (unless otherwise indicated)	Precautions and Days Between Last Application & Harvest
Okra	Aphids	When insects appear	Mevinphos (Phosdrin) EC	0.25	1 day
			OR		
			Malathion D-EC-WP	1.2	1 day
			OR		
			Parathion D-EC-WP	0.5	21 days
	Earworm, stink bugs, leaf footed bugs	When insects appear	Carbaryl (Sevin) D-WP	2.0	On foliage as needed
Onions	Thrips	When damage appears	Mevinphos (Phosdrin) D-EC-WP	0.5	1 day
			OR		
			Malathion EC-WP	1.0	3 days for green onions
			OR		
			Diazinon D-EC-WP OR	1.2	10 days
			azinphosmethyl (Guthion)	0.5 lbs.	7 days not more than 3 times per season.
Peas (Garden or English)	Aphids	When insects appear	Malathion D-EC	1.0	3 days, 7 days if forage fed to livestock
			OR		
			Mevinphos (Phosdrin) EC	0.5	1 day
			OR		
			Parathion EC-WP	0.5	10 days
Peas (Southern)	See separate section on Southern peas				
Peppers	Cutworms	When damage appears	Toxaphene	2.0	Broadcast and work into soil before planting
			OR		
			Trichlorfon (Dylox) bait	1.0-1.25	Spread bait on soil (not on plants)
	Flea beetles, Colorado potato beetle, earworm, European corn borer, horn-worms	When insects appear in damaging numbers	Carbaryl (Sevin) D-WP	2.5	No limitations
			OR		
			Endosulfan (Thiodan) EC-WP	0.5	1 day
	Aphids	When aphids appear in damaging numbers	Mevinphos (Phosdrin) EC	0.25	1 day
			OR		
			Naled (Dibrom) D-EC OR	1.5	4 days
			Nudrin EC	2 pts.	10 days
Potatoes (Irish or white)	Colorado potato beetle, potato leafhopper, flea beetles	When insects or insect damage appears	Carbaryl (Sevin) D-WP	1.0-2.0	No limitations. Foliage applications only
			OR		
			Endosulfan (Thiodan) D-EC-WP OR	0.5-1.0	No limitations
			Monitor EC OR	0.75-1.0	14 days (also controls aphids and loopers)
			Disulfoton (Di-Syston G)	2.0-3.0	Apply in furrow at planting or broadcast before planting. 75 days.

VEGETABLE INSECT CONTROL RECOMMENDATIONS FOR COMMERCIAL GROWERS (Cont.)

Potatoes (Cont.)	Aphids, blister beetles	When insects appear in damaging numbers	Malathion D-EC OR Endosulfan (Thiodan) D-EC-WP	1.0 0.5-1.0	No limitations No limitations
	Wireworms, grubs	Prior to planting in fields infested with these insects	Chlordane EC-WP-G OR Diazinon EC-G-WP OR Disulfoton (Di-Syston) G OR Phorate (Thimet) G OR Dyfonate G	5.0-6.0 2.0 2.0-3.0 2.0-3.0 2.0	Broadcast on soil and immediately work thoroughly into upper 4-6 inches of soil Pre-plant band soil application. Do not apply after planting Apply in furrow at planting or broadcast before planting. Apply in furrow at planting or broadcast before planting. Wait 90 days before harvest Check label
Radishes	Flea beetles, caterpillars	When insects appear in damaging numbers	Carbaryl (Sevin) D-WP OR Parathion EC	2.0 0.5	3 days 15 days
	Aphids	When insects appear in damaging numbers	Malathion D-EC OR Diazinon EC-WP	1.0 0.5	7 days 10 days
	White grubs	Prior to planting time in fields infested with grubs	Diazinon EC-G-WP OR Dyfonate G	2.0 2.0	Disc material into top 2 inches and no deeper for best results Broaddcast and incorporate into the soil by discing
Spinach	Aphids, plant bugs, caterpillars (loopers), leafhoppers loopers, Beet armyworm	When insects appear or as needed to keep crop free of insects	Parathion EC OR Mevinphos (Phosdrin) EC OR Methomyl (Lannate or Nudrin)	0.5 0.5 0.5-1.0	14 days 4 days 16 days
Sweet Corn	Flea beetle	When damage appears	Carbaryl (Sevin) D-WP OR Sevimol 4	1.5 1 1/2 qts.	No limitations No limitations
	Earworm	When worms appear	Carbaryl (Sevin) WP OR Methomyl (Lannate) SP OR Methomyl (Lannate or Nudrin) EC	1.5 0.45 1-2 pts.	Wet silks thoroughly at 1 to 2 day intervals Apply at 2 day intervals when silks first appear. Continue until they turn brown Do not feed to livestock within 3 days
	Budworms (fall armyworms and earworms in whorls of plant)	Apply to whorls when damage is prevalent	Carbaryl (Sevin) WP OR Methomyl (Lannate or Nudrin) EC	2.0 2 pts. 2 pts.	No limitations Do not feed or graze within 3 days
	European corn borer, southwestern corn borer	When 50% of plants show rows of tiny pinholes in leaves	Carbaryl (Sevin) WP OR methomyl (Lannate or Nudrin) EC	2.0 2 pts.	No limitations Do not feed or graze within 3 days.

Crop	Insect	When to Treat	Treatment*	Pounds Actual Insecticide Per Acre As Dust or Spray** (unless otherwise indicated)	Precautions and Days Between Last Application & Harvest
Sweet Potatoes	Cutworms	When damage first appears	Toxaphene EC-D	2.0	No residue should occur when toxaphene is used on newly set plants for cutworm control.
	Flea beetle, Tortoise beetle	When damage occurs	Carbaryl (Sevin) D-WP	2.0	No restrictions
			OR		
			Methoxychlor D-EC-WP	2.0	On leaves as needed
			OR		
			Endosulfan (Thiodan) EC	0.5	Repeat as needed
	Wireworms and other soil insects	Apply diazinon granules over the row after roots begin to enlarge	Diazinon G	3.0	Put over top of row when roots begin to enlarge. Aids flea beetle control
			OR		
			Dyfonate G	2.0-4.0	Pre-plant soil application
Tomatoes	See separate section on tomatoes.				

* D = Dust
EC = Emulsifiable concentrate
WP = Wettable powder
G = Granules
B = Bait
SP = Soluble powder

**If the amount of actual pesticide recommended per acre is 1 pound, the amount of formulation required to obtain this 1 pound is as follows:

15%-20% EC (contains 1¼ lbs. chemical per gal.)	2⅔ qts. = 1 pound actual
25% EC (contains 2 lbs. chemical per gal.)	2 qts. = 1 pound actual
40%-50% EC (contains 4 lbs. chemical per gal.)	1 qt. = 1 pound actual
60%-65% EC (contains 6 lbs. chemical per gal.)	1⅓ pts. = 1 pound actual
70%-75% EC (contains 8 lbs. chemical per gal.)	1 pt. = 1 pound actual
50% WP	2 lbs. = 1 pound actual
80% WP	1¼ lbs. = 1 pound actual
10% Dust	10 lbs. = 1 pound actual

The pesticide label will indicate the pounds of actual chemical in the container.

Cabbage Looper Control—Cabbage looper on certain commercial vegetable crops is the most serious insect problem. Control is complicated by residue restrictions and resistance to approved insecticides. Parathion will still adequately control cabbage loopers on green crops. Research shows that parathion applications should be initiated when the very first newly hatched worms appear. However, with a little practice, looper eggs can be found easier than newly hatched worms. Begin treatments at one to two eggs per two row feet. Continue on a three day interval until looper eggs and larvae are no longer present. Phosdrin should be used between the last application of parathion and harvest date if looper eggs or larvae are still present. **Parathion applications must begin when worms begin to hatch to make the program outlined above a success.**

Bacillus Thuringiensis (Thuricide, Biotrol or Dipel) and Lannate or Nudrin have been added for looper control where applicable (see table). It should be emphasized that B. thuringiensis kills rather slowly (3 to 5 days.) B. thuringiensis will, under certain conditions, control large loopers. However, it is more effective on small loopers.

Lannate may burn some crops rather severely under certain weather conditions.

CUCUMBER INSECT CONTROL (COMMERCIAL)

Insect Controlled	Insecticide Formulations	Amount Per Acre	Days Between Last Application and Harvest
Cucumber bettles Darkling beetles Blister beetles Squash bugs	Thiodan 50% WP	0.5 - 1 lb.	0 day
	OR		
	Thiodan 4% D	20 lbs.	0 day
	OR		
	*Sevin 50% WP	2 lbs.	0 day
	OR		
	*Sevin 5% D	20 lbs.	0 day
	OR		
	Malathion 25% WP	2.5 - 5 lbs.	1 day
	OR		
	Malathion 5% D	20 lbs.	1 day
	OR		
	Methoxychlor 50% WP	3.5 lbs.	1 day
Aphids	Malathion (WP or D as recommended for cucumber beetles)		
	OR		
	Thiodan (WP or D as recommended for cucumber beetles)		
	OR		
	Phosdrin 2 EC	1 - 2 pints	1 day
	OR		
	Phosdrin 2% D	20 lbs.	1 day
Pickle worms	*Sevin (WP or D as recommended for cucumber beetles)		
	OR		
	Thiodan (WP or D as recommended for cucumber beetles)		
Mites	Kelthane 35% WP	1 - 1.7 lbs.	7 days
	OR		
	Ethion 25% WP	2 lbs.	0 days
	OR		
	Ethion 4EC	1 pint	0 days

EC = emulsifiable concentrate WP = wettable powder D = dust

*Sevin may burn cucumbers, especially when vines are wet. Apparently gives rise to mite buildups and is very rough on pollinating bees.

INSECT CONTROL ON SOUTHERN PEAS

Insect	Timing and Control Measures	Insecticide	Formulation Dust	Formulation Spray	Actual Amount/ Acre	Precautions & Days Between last Application and Harvest
Lesser corn stalk borer	Fallow seed bed. Keep free of all vegetation for three weeks before planting.	Diazinon 14% Granules (Apply in a 6-10 inch band over seedling plants when they are in the 2-leaf stage)			7-14 lbs.	No residue problem when used as directed
Bean leaf beetle	Plant early. Use treatment to prevent defoliation.	Sevin (carbaryl)	X	X	1 lb.	No time limitations when used as directed.
Cowpea aphid	Delay treatment to encourage beneficial insects when possible.	Malathion	X	X	1¼ lbs.	3 days
		Parathion		X	½ lb.	10 days
		Diazinon		X	¼ lb.	4 days (if forage cut for hay)
		Phosdrin	X	X	1/2 lb.	1 day
Cowpea curculio	Begin at bloom to kill adults before eggs are laid in pods. One application at bloom and two additional applications at 3-day intervals.	Toxaphene*	X	X	3 lbs.	Do not use after pods begin to form if pods are to be used as food or within 7 days of harvest if pods are not to be used as food.
	On foliage when pods are ½ inch long. Make applications at 5-day intervals.	Thiodan* (endosulfan)	X	X	1 lb.	Do not apply more than 2 times during fruiting period. Use only on peas to be harvested by combine.
	Beginning when first blossoms appear, make 4 applications at 5-day intervals.	Guthion* (azinphosmethyl) 2 lb. liquid concentrate		X	3-4 pts.	Do not apply more than 4 times per season or within 7 days of harvest.
Corn earworm	When 5 to 10 small worms are found on 100 plants. After blooming.	Sevin (carbaryl)	X	X	1 lb.	No time limitations when used as directed.
		Guthion* (2 lb. liquid concentrate)		X	3-4 pts.	Do not apply more than 4 times per season or within 7 days of harvest.
Cowpea weevil	In storage.	Common grain fumigant or residual dust				Treat peas to eat with fumigant only. Use residual insecticide on seed peas only.

*Do not feed treated vines to dairy animals or animals being finished for slaughter. Do not allow livestock to graze in treated fields.

TOMATO INSECT CONTROL (COMMERCIAL)

PEST	PESTICIDES	Pounds Actual Pesticide Per Acre as Spray or Dust*	Minimum Days Last Application To Harvest	TIMING
Fruitworms, Hornworms	endosulfan (Thiodan),	1 lb.	1	Make applications at 7 day intervals beginning at fruit setting to control fruitworms.
	carbaryl (Sevin),	2 lbs.	0	
	Lannate, or	½ lb.	1	
	Nudrin,	2-4 pts.	2 pts. 1 day; over 2 pts. 2 days	
Fruitworms	carbaryl (Sevin)	1.0 lb.	Apply on foliage as needed.	
	Bacillus thuringiensis (Thuricide, Biotrol, Dipel)	0.5 lb.		
Cabbage Loopers	Nudrin,	Same as for fruitworms		
	Lannate,	½ lb.	1	Large loopers are hard to control with any material. Apply when worms are small. Loopers are usually a late summer tomato problem.
	endosulfan (Thiodan),	1 lb.	1	
	Phosdrin,	½ lb.	1	
	or			
	Bacillus thuringiensis	2-3 qts. aqueous suspension concentrate or 4 lbs. WP/Acre	0	
Colorado Potato Beetles, Flea Beetles Stinkbugs	carbaryl (Sevin),	1-2 lbs.	0	On foliage as needed.
	or			
	endosulfan (Thiodan)	1 lb.	1	
	endosulfan (Thiodan)	1 lb.	1	On foliage as needed.
	or			
	carbaryl (Sevin)	2-4 lbs.	0	
Leaf Miners or Aphids	endosulfan (Thiodan),	1 lb.	1	On foliage as needed.
	Diazinon,	½ lb.	1	
	dimethoate (Cygon or De Fend),	½ lb.	7	
	ethion,	½ lb.	2	
	or			
	malathion	1 lb.	1	
Spider Mites	Kelthane,	½ lb.	2	Spray when present in damaging numbers. Do not apply Tedion more than 3 times during fruiting season.
	ethion,	½ lb.	2	
	or			
	Tedion	½ lb.	0	

*If the amount of actual pesticide recommended per acre of tomatoes is 1 pound, the amount of formulation required to obtain this 1 pound is as follows:

15%-20% EC (contains 1¼ lbs. chemical per gal.)	2⅘ qts. = 1 pound actual
25% EC (contains 2 lbs. chemical per gal.)	2 qts. = 1 pound actual
40%-50% EC (contains 4 lbs. chemical per gal.)	1 qt. = 1 pound actual
60%-65% EC (contains 6 lbs. chemical per gal.)	1⅗ pts. = 1 pound actual
70%-75% EC (contains 8 lbs. chemical per gal.)	1 pt. = 1 pound actual
50% WP	2 lbs. = 1 pound actual
80% WP	1¼ lbs. = 1 pound actual
10% Dust	10 lbs. = 1 pound actual

EC = emulsifiable concentrate
WP = wettable powder

The pesticide label will indicate the pounds of actual chemical in the container.

Home tomato growers should consult Extension Leaflet No. 404, Vegetable Insect Control for Home Gardeners, to determine the amount of insecticide to use in one gallon of water. Insecticide or fungicide container labels will also furnish this information.